



LUND UNIVERSITY
School of Economics and Management

The dynamics of industrial influences and consumer behavioural intentions in early phase innovations

Extending the model of TPB to understand the case of cellular
agriculture in China

by

Sofie Bergdahl & Pehr Ekedahl

June 2019

Master's Programme in International Strategic Management

Supervisor: Thomas Kalling

Abstract

This paper aims to synthesise and build further on recent research of consumer behaviour, in order to explain how the industry affects consumer behavioural intentions towards early phase innovations. The rationale for this relies on the non-accessibility of early phase innovations and the implication that they cannot yet be experienced by consumers, which further means they cannot be objectively evaluated. In this study, the case of cellular agriculture in China was used as a general example of early phase innovations. Moreover, by investigating and comparing the two sub-industries of meat and dairy through the theoretical perspective of *the theory of planned behaviour* (TPB), this research highlights key differences in industrial impact and followingly, consumer intentions towards those products. The study was conducted through a qualitative approach where eight interviews were held with different representants from the industry. These interviews were also complemented by previous research on consumer attitudes toward the study object as well as a market scanning process of the development of cellular agriculture, in order to contextualise the case and enable a better analysis of the primary data. The results show that the industry affects consumer behavioural intentions toward early phase innovations in an intertwined way, which is summarised in two main findings. Firstly, it shows that consumers' base their perceptions of familiarity on the information that is provided through the industry's actions. Secondly, these actions performed by the industry is influenced by the industry's perceptions and interpretations of the market need for the early phase innovation. Based on this, this study specifically highlights the importance of the consumers' *perceived behavioural control*, which is one of the original components of the TPB framework, as well as an extension of the theory to also include *the industry's collective perceptions and interpretations of market need*, to enable a better understanding for consumer behavioural intentions toward early phase innovations.

Keywords: Theory of planned behaviour, early phase innovation, cellular agriculture, consumer attitude, industrial influences.

Acknowledgements

The completion of this thesis would not have been possible without the the help of a number of people.

Firstly, we would like to express our sincerest gratitude to Prof. Dr. Thomas Kalling for his continuous support and guidance throughout the process of this project. His flexibility, as well as his sharp feedback has not only been crucial for the writing of this thesis, but also for our learning process along the way.

Secondly, we would like to direct our appreciation towards our interview respondents, without which this thesis would not have been possible to complete. Their willingness to contribute with reflections and opinions is the foundation upon which our study and our findings stand.

Lastly, we would like to thank our fellow students, friends, family and significant others for the support they have given us during the writing of this thesis.

Table of Contents

- 1 Introduction 7**
 - 1.1 Background 7
 - 1.1.1 An agriculture industry in need of change 7
 - 1.1.2 Cellular agriculture and its’ disruption potential..... 8
 - 1.1.3 The theoretical perspective of consumers’ behavioural intentions 10
 - 1.2 Research problem 12
 - 1.3 Research Purpose 13
 - 1.4 Research Limitations..... 13
 - 1.5 Outline of the Thesis 13
- 2 Literature review 15**
 - 2.1 The theory of planned behaviour..... 15
 - 2.1.1 TPB in the context of early phase innovations..... 17
 - 2.1.2 TPB in the context of stimulating sustainable behaviour..... 21
 - 2.1.3 Summary of previous applications of TPB 22
 - 2.2 Industrial shifts 23
 - 2.2.1 Responses to industrial shifts 24
 - 2.3 Towards an extended framework of TPB..... 26
- 3 Methodology 28**
 - 3.1 Research Approach..... 28
 - 3.2 Research Design 29
 - 3.3 Selection of case 29
 - 3.4 Data Collection Method 30
 - 3.4.1 Primary data 30
 - 3.4.2 Secondary data 33
 - 3.5 Data Analysis 34
 - 3.6 Quality of study 34
 - 3.6.1 Credibility (Internal validity) 35
 - 3.6.2 Transferability (External validity)..... 35
 - 3.6.3 Dependability (Reliability)..... 36
 - 3.6.4 Confirmability (Objectivity)..... 36
- 4 Empirical Findings 38**
 - 4.1 Secondary data and case description 38
 - 4.1.1 The emergence of cellular agriculture..... 38

4.1.2	The market development of cellular agriculture	39
4.1.3	Research on consumer attitude towards cellular agriculture.....	41
4.2	Primary data	43
4.2.1	The Chinese meat and dairy consumption	43
4.2.2	Perception of industries	46
4.2.3	Cellular agriculture.....	49
4.3	Chapter summary	54
5	Analysis & discussion.....	55
5.1	Industry’s collective perceptions and interpretations of the need for cell-based meat 56	
5.1.1	The conventional meat industry in China today.....	56
5.1.2	The industry’s perceptions of the development within the meat industry	57
5.1.3	The industry’s perceptions of consumers’ behavioural intentions towards cell- based meat	59
5.1.4	Industrial actions in relation to the cell-based meat movement	61
5.2	Industry’s collective perceptions and interpretations of market need for cell-based dairy 62	
5.2.1	The conventional dairy industry in China today	62
5.2.2	The industry’s perception of the development within the dairy industry.....	62
5.2.3	The industry’s perceptions of consumers’ behavioural intentions towards cell- based dairy.....	65
5.3	Chapter summary	66
6	Conclusion.....	68
6.1	Research purpose.....	68
6.2	Theoretical implications	68
6.3	Practical implications	69
6.4	Limitations & future research.....	70
	References	72
	Appendix A	78
	Appendix B.....	80

List of Tables

Table 1: List of respondents.....27

List of Figures

Figure 1: Theory of planned behaviour (Ajzen 1991).....11
Figure 2: Preliminary Framework21
Figure 3: Final Framework.....49

1 Introduction

1.1 Background

1.1.1 An agriculture industry in need of change

As environmental issues have risen to the public's awareness, the food industry has been identified as one of the most significant sources of contribution, where not least the agriculture industry has been challenged by climate change during the last years (United nations environment programme 2019). The agriculture industry includes several sub-industries but special environmental concerns have been dedicated the methane production caused by cows' digestion (Mattick 2018), why the consumption of agricultural products such as meat and dairy are more frequently challenged than ever before. In fact, it has been issued as the most resource-intensive food industry out of all, with the most damaging environmental impact (Tucker 2014). Despite this, the consumption of agricultural products are not decreasing in the pace it needs to, and in some countries, it even increases. One of the fastest growing markets for meat and dairy in China, where meat consumption per capita has increased by 300 % between 1990 and 2017 (OECD 2018), and the Chinese milk industry has gone from the 24th largest in 1990 to the 4th largest in 2017 (Dubois & Alisha 2017). In 2015, numbers issued in a report made clear that 35 % of the Chinese land surface was used for livestock production, out of which 38 % of the arable land was used to grow livestock feed crops and 31 % for grazing (Wang in Sun, Yu & Han 2015).

China's rapid economic growth (The world bank 2019) has been suggested as a main factor to the increased meat consumption specifically (Bai, Lee, Ma, Ledgard, Oenema, Velthof, Ma, Guo, Zhao, Wei, Li, Liu, Havlik, Luo, Hu, & Zhang 2018), which is supported by the general correlation between an increased wealth and increased consumption of agricultural products (Bai et al. 2018; Fuller, Huang, Ma & Rozelle 2006; Tucker 2014). The Food and Agriculture Organization of the United Nations (FAO) predicted in 2011 that the Chinese meat consumption was likely to double between 2010 and 2050 (Sun, Yu & Han 2015), but in the light of the environmental impact of the industry, this trend has been a target for a drastic change. In fact,

the Chinese Health Ministry has now conducted new dietary guidelines to reduce domestic meat consumption by 50 % during the period of 2016 and 2030 (Milman & Leavenworth 2016).

Despite the common ground of livestock for meat and dairy industry, however, the latter has not been a target for reduction to the same degree as the meat industry. On the contrary, the focus have been to subsidise the development of more efficient and sustainable productions (Bai et al. 2018) and to highlight the benefits of dairy consumption. For example, dairy products have been recommended as a nutritional supplement for the youngest and oldest population groups (Zhou, Tian & Zhou 2002) for daily consumption based on general dietary guidelines (Fuller, Huang, Ma & Rozelle 2006) and as a healthy source of cheap and sustainable protein (Dubois & Alisha 2017). Additional to this, the government has also sponsored China's largest dairy companies, which is support their counterparts in the meat industry has not gotten (Dubois & Alisha 2017). Thus, while the meat industry is accused to be an environmental hazard, the consumption of conventional dairy is supported and projected to increase even further. According to Bai et al. (2018), the demand for dairy products in 2050 is predicted to be 2,3 times as high as the production level in 2010.

1.1.2 Cellular agriculture and its' disruption potential

One field that has attracted much attention on a global level is the technological shift within the agricultural sector, and its' ability to reduce the environmental footprint caused by the agricultural industry (Sun, Yu & Han 2015; Zorpette 2013; Dance 2017; Bhat & Fayaz 2011). Specifically, the movement of cellular agriculture has by many been discussed as a promising substitute for traditional agriculture products (Carrington 2018; Rodriguez Frenández 2018). Despite that cellular agriculture is still in its' infancy and has not yet been introduced to the market, the potential accomplishment of technique has been raised by many. Cellular agriculture enables the process of growing real animal cells into products that have identical characteristics to those from its' conventional counterparts (Kahn 2018). One of the largest studies regarding the potential of cellular agriculture was conducted by Tuomisto and De Mattos in 2011, where they made several comparisons to the conventional European agriculture business and their study have further been referred to by many scholars. According to them, cellular agriculture could result in 7896 % lower greenhouse gas emissions than conventionally produced meat. They also suggested that the land use would be 99 % lower, energy use

approximately 745 % lower and that the water use could be as little as 8296 % lower depending on what product that was compared.

However, the degree of truth in these statements has been criticised by several scholars, meaning that these findings are based on early assumptions and that supporters to cellular agriculture have continued to reuse their findings in an optimistic manner (Mattick, Landis, Allenby & Genovese 2015; Mattick 2018). Specifically, critics suggest that these benefits come with the cost of an intensive increase in energy use. The reason for this is that the same biological functions that take place in the animal's body, must also be recreated in the lab which requires a substantial increase of industrial energy (Mattick et al. 2015). However, Dance (2017) has suggested that the type of energy source will have a great impact on this calculation. Seeing to that also this is a target for more sustainable development, it can be assumed that the case of cellular agriculture will continue to be a target for debate and that uncertainty still surrounds this new technology. Nevertheless, scholars seem to agree on the opportunities that the technology could bring to the welfare and human health (Mattick 2018; Bhat & Fayat 2011). As cellular agriculture enables so-called 'clean cells' to develop and grow further (Dance 2017), it has been suggested that the production process can be safer and that substances such as antibiotics can be eliminated. Also, the ability to control the quantity and type of fat added to the process, the potential to reduce obesity and cardiovascular disease have also been ascribed to cellular agriculture (Bhat & Fayas 2011).

Even though cellular agriculture has not yet reached the market, some studies have already been conducted to investigate consumers' attitudes towards the technology. One example is the study conducted by Bekker, Tobi & Fisher (2017), in which they investigated how consumers in China, Ethiopia and the Netherlands perceived cell-based meat products and whether they believed it to be a sufficient substitute to conventional meat. In this study, the participants were given a descriptive text about cell-based meat which served as a guarantee to that they had at least a comparable minimum level of understanding of what cell-based meat is. The results of the study indicated that cell-based meat was associated with the future and that specifically Chinese and Dutch participants made positive correlations to the benefits of cell-based meat. Chinese participants were the most positive, while the other more often draw on associations such as unnaturality and artificiality.

However, the fact that no consumer has yet been exposed to cell-based agricultural products remains. It is therefore likely that their attitudes towards cellular agriculture are influenced by other, less obvious factors. One study that has focused specifically on such cognitive biases towards food, where for example Gallen, Pantin-Sohier & Peyrat-Guillard (2019) aimed to understand the cognitive processes that determine consumers' perceptions of what is edible. In this study, they used the case of insects protein and emphasised the difficulty to establish products that collide with consumers' interpretations into something that consumers demand and accept. Building on the same note as these previous scholars, we believe this is not a scenario that applies solely to insects but could also be referred to in the case of cell-based agricultural products, as both represent innovations that are hard for consumers to relate and objectively evaluate. However, in order to understand consumers' attitudes towards early phase innovations, it might be valuable to also deepen our understanding of consumer behaviour in general.

1.1.3 The theoretical perspective of consumers' behavioural intentions

One scholar that is often referred to in the literature of consumer behaviour is Icek Ajzen, who proposed the theory of planned behaviour, further referred to as TPB, in 1985 and further suggested an extension in 1991 (Ajzen 1985; Ajzen 1991). The theory aims to describe the human behaviour in specific contexts (Ajzen 1991) and has been applied to various research fields such as consumer decisions (Giampietri, Verneau, Del Giudice, Carfora & Finco 2018; Shepherd & Saghaian 2015), green consumerism (Wang, Wang, Wang, Li & Zhao 2018; Taufique & Vaithianathan 2018; Chung 2016), marketing (Leavell 2016), early phase innovations (Chen & Huang 2016; Msaed, Al-Kwif & Ahmed 2017; Yang, Lee and Zo 2017) and business model innovations with implications on consumer behaviour (Bachmann, Hanimann, Artho & Jonas 2018; Zhang, Guo, Yao, Li, Zhang & Wang 2018). The basic idea of the theory is that the individual's intention to perform a given behaviour determines whether the behaviour is performed and that this intention is a result of the individual's attitude towards the behaviour, its subjective norms and the perceived behavioural control. The first determinant, *attitudes towards the behaviour*, relates to the evaluation and appraisal of the behaviour, whereas the second determinant, *subjective norms*, constitute the perceived social pressure of whether to perform the behaviour. The third determinant, *perceived behavioural control*, refers to the perceived ease of performing a specific behaviour and how familiar the behaviour is to the consumer. In summary, TPB suggests that the likeliness of a certain behaviour to take place

is determined by the level of these three components, and followingly, presents a way to predict consumers' behaviour (Ajzen 1991).

No matter the theory's dominance in its' field the last decades, it has also been a target for criticism. Specifically, it has been suggested that it does not consider unconscious influences that affect the individual's beliefs and that it has a too rational approach towards behaviour (Sheeran, Gollwitzer & Bargh 2013). Furthermore, it has also gained criticism for not being the predictive tool that it has been suggested to be, due to that it investigates the intention from a static perspective which tells little about future behaviour (Sniehotta, Pesseau & Araújo-Soares 2014). In the light of the TPB's insufficiency to explain every behaviour of interest, several attempts have already been made to extend the theory by adding components of suggested importance. Some scholars have evaluated the framework's performance in cases of early phase innovations, specifically, but when reviewing the previous research on these fields, there are reasons believe their findings are not fully to the case of cellular agriculture. Firstly, these studies often address innovations from a very technology focused perspective (Chen & Huang 2016; Weigel, Hazen, Cegielski & Hall 2014; Vargas, Yurova, Rupper, Tworoger & Greenwood 2018). As a consequence of this, these scholars' extension suggestions tend to explain individuals' intentions towards the technology itself, mainly by adding components from technology acceptance theories. Although the case of cellular ag belongs to the emerging fields of food technology, he study of insect protein (Gallen, Pantin-Sohier & Peyrat-Guillard 2019), proves that there are more than technological aspects to consider when investigating consumer intentions toward food products.

Related to this, other studies have applied TPB to investigate innovation that challenges consumers' preconceptions about a certain behaviour. For example, Zhang et al. (2018) and Bachmann et al. (2018) have in two parallel studies investigated individuals' adoption intention of carpooling and found the component of behavioural control to be of particular importance. However, the problem with generalising these findings to the case of cellular agriculture is that the study object of these studies was already accessible and available to the consumer, why their consumer behavioural intention could be based on actual experience. Nonetheless, a separate finding of Zhang et al. (2018) provides some answers to apply TPB to innovations such as cellular agriculture. They suggested that policymakers have the ability to impact consumers' behavioural intentions by issuing policies to push individuals in a desirable direction. This can very well be an important aspect also for cellular agriculture, as

policymakers and institutions might impact the development of early phase innovations. However, other industrial actors, such as incumbents and innovators, also possess the ability to affect this development, as their actions can have major implications for the innovation's accessibility and followingly, also consumers' ability to evaluate the innovation trustworthily. It is therefore relevant to consider the industry development in general and its' impact on consumers' behavioural intention towards early phase innovations such as cellular agriculture. In light of this, we believe that TPB could be better applicable to such cases if extended with theories that apply to industrial shifts. Specifically, by adding perspectives that explain the drivers behind disruptive innovation as well as industrial responses to such exposure, an extended version of TPB could be used as a tool to further understand the industry and the impact it has on the consumers' intentions in the next stage.

1.2 Research problem

In general, the business landscape has become more innovation-intensive in the latter years (KPMG 2019), and predicting consumer behaviour grows in importance proportionally. When looking to the case of disruptive innovations, this is emphasised even further. When an industry or market is about to be disrupted and changed in its' very foundation, the consumer behaviour of the previous solution is most likely not directly translatable to the new solution. Furthermore, when developing a new product that could potentially disrupt an industry or market, large investments are needed and a lot of risks are taken from the innovator's side. During this process, it is crucial to acquire knowledge about the consumers' behaviour towards the new solution. To do so, insights about what influences and constructs the consumers' attitudes are crucial, especially when looking at early phase innovation not yet available, nor experienced before.

As outlined above, several attempts have been made to provide a sufficient theoretical framework to evaluate consumers' behavioural intention towards innovations. However, none of these studies has successfully highlighted the preliminary aspect of consumer behaviour intentions towards early phase innovations. Nor have any study investigated specifically how these intentions are influenced by the related perceptions held by the industry on a collective level. Therefore, further attention has to be paid to the dynamics between the consumers and the industry itself. First when doing so can these factors that influence consumers' behavioural

intention towards early phase innovations be identified. Therefore, this study aims to investigate the following research question: *How does the industry affect consumer behavioural intentions towards an early phase innovation?*

1.3 Research Purpose

The purpose of this study is to provide an understanding of how the industry affects consumer behavioural intentions towards early phase innovations. In order to do this, we intend to use the Chinese conventional meat respective dairy industry as an instrumental case and investigate representative industrial actors' view on the conventional industries, as well as their attitude towards the development of cellular agriculture and its' applicability to Chinese consumers. By doing so, the aim and objective are to extend the theory of planned behaviour with the perspective of the industry's role in affecting and shaping consumers' behavioural intention towards early phase innovations.

1.4 Research Limitations

The research limitations of this study are mainly related to the scope of the research. The choice of China as the focal market limits the findings to a context similar to the Chinese market, meaning a market with similar governmental characteristics and consumer preferences. Moreover, the choice of cell-based food products as the early phase innovation presents rather unique characteristics in terms of the market they pertain to disrupt. The food industry has been characterised by incremental innovations for a long time, and therefore, the findings of this study is more suitable to apply to early phase innovations that pertain to disrupt a market not exposed to radical innovation recently, even though it will be applicable to markets with more recent radical innovations as well.

1.5 Outline of the Thesis

The remainder part of this thesis will be structured as follows. First, we will outline the theory of planned behaviour, and present the historical development of Ajzen's (1991) work.

Thereafter, we will discuss the limitations of the framework and provide the reader with a comprehensive review on how the theory has been applied as well as which extensions that have been suggested previously. However, the selection of studies is by no means covering all applications that have been made of TPB, due to that the framework is one of the most frequently used when investigation consumer behaviour. Our ambition in this section is rather to focus specifically on such applications that in different ways relate to our study. The remainder part of the literature review will outline the theoretical perspective of industrial shifts, with a specific focus on the characteristics that drive the development of disruptive innovation. We will also present the theoretical view on the dynamics that typically occur within an industry when it is exposed to such a disruptive innovation, as well as outline the interrelation between industry incumbents, innovators and policymakers. Followingly, we will summarise the most key aspects of the literature review and present a preliminary new extended version of the TPB framework.

Thereafter, we will present the methodology of this study, which has primarily been based on a qualitative interview study. Our empirical data is presented in a separate chapter, which is followed by an analysis, where we will apply revise our preliminary framework in line empirical findings In the last chapter of this study, we will draw on concluding remarks and confirm the applicability of the preliminary framework. As a final discussion, we will suggest the practical and theoretical implications of this study, as well as highlight limitations, criticism and further research possibilities.

2 Literature review

2.1 The theory of planned behaviour

The theory of planned behaviour (TPB) was developed by Ajzen in 1991 and is an extension of Fishbein's theory of attitude from 1963, later referred to as the expectancy model (Fishbein & Ajzen 1975), which was one of the first to provide an understanding of the relation between people's attitudes and their beliefs. The idea was that an individual's subjective values and associations towards a psychological object determine the overall attitude towards that object, meaning that previous references and experiences impact what the individual will perceive. Accordingly, the expectancy model showed that attitudes are not rational and that they are formed by beliefs which in turn could be biased by cognitive and motivational processes (Ajzen 2012). However, even if the model brought an increased understanding of behavioural intention formation, its' ability to explain and predict actual behaviour has been questioned. This criticism was especially based on the rationale that people do not necessarily act according to their attitudes (Ajzen 2012).

The lack of correlation between attitudes and action was addressed by LaPiere as early as 1934 and led to the collaborative work between Fishbein and Ajzen, who later proposed the valuable finding that attitudes and behaviour are mediated by an intention. This assumption became to be the main contribution in Fishbein and Ajzen's first theoretical framework, the theory of reasoned action, further referred to as TRA (1980). The TRA model suggests that the intention is constructed by two determinants, where attitude is one determinant. In contrast to previous theory, however, they now made a difference between general attitudes and attitudes that generate a certain behaviour. They claimed that an attitude itself does not necessarily lead to a behaviour, as an individual can have attitudinal perceptions that logically do not require a response. Followingly, only when the attitude is related to a concrete action it can be seen as a determinant to an individual's behaviour. The other determinant of the TRA model is the individual's normative beliefs, which relates to the subjective understanding of others' perceptions regarding the behaviour. An individual can base its' subjective norms on several

reference groups and the theory specifically suggests the individual's partner or close friends and family as influencers to their behaviour. However, depending on the situation and character of the behaviour, the theory suggests that reference groups such as co-workers, law enforcement authorities and health professionals could also be considered by the individual (Ajzen 2012).

The TRA framework has many similarities with the framework of TPB, which later provided an even more extended understanding of how behavioural intentions are formed. While the TRA highlighted the importance of intentions as the mediating factor, the TBP builds on the same logic and suggests the concept of perceived behavioural control to be added as a third crucial determinant. This refers to the individual's perceptions of the ease or impediments of performing a certain behaviour, which is based on situational factors as well as the individual's available resources. Example of such resources could be time, money and the individual's knowledge about the situation. Similar to attitudes and subjective norms, this is also influenced by the beliefs of the individual, which is identified as a control belief. This control determinant was suggested as the last factor to enable a complete understanding of individual's behaviour, but contrary to the other components that impact the behaviour indirectly, the control component was also suggested to have a direct link to the behaviour itself. This is because not all behaviours are actually possible to execute, which implies logical consequences to whether the behaviour will be performed or not (Ajzen 1991).

TPB has been used by numerous scholars since its' development and has been applied to many different domains, both in order to predict behaviour and to understand how behaviour can be modified in a desirable manner. Such intervention studies often rely on the assumption of two necessary prerequisites, namely that the desired behaviour must motivate the individual and that it must be supported in a way that the individual to accomplish the behaviour. Thus, when the theory is used to understand how behaviours can be engineered, its' focus is often directed towards the control factor and how the desired behaviour can be facilitated for the individual to perform. The framework of TPB is illustrated below and shows those three kinds of considerations that influence the action taken by an individual (Ajzen 2012).

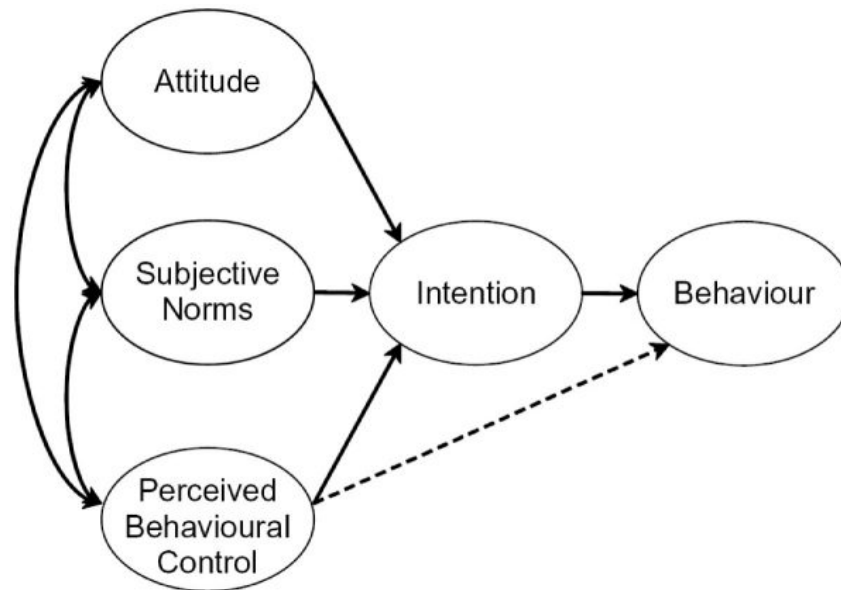


Figure 1: Theory of planned behaviour (Ajzen 1991)

Despite the many strengths of the TBP concept, much have changed in the environment since it was developed and many scholars have questioned its' usability when investigating behavioural factors that characterise today's society. For example, the original TPB has been criticised for being insufficient to explain the relation between innovation acceptance and behaviour (Yang, Lee & Zo 2017; Msaed, Al-Kwif & Ahmed 2017; Weigel et al. 2014), as well as that the static perspective implies little help to understand whether future behaviour actually will be realised in accordance with predicted intention (Sniehotta, Pesseau & Araújo-Soares 2014). Furthermore, many have criticised the theory's inability to include unconscious aspects that influence the individual's behaviour, meaning that the theory is too focused on rational reasoning (Sheeran, Gollwitzer & Bargh 2013). In the next section of this chapter, we will, therefore, review a number of previous studies that provide additional aspects to increase the understanding of consumers' behavioural intentions. In accordance with the aim of this study, we will start with presenting such studies that have applied the TPB to early phase innovation contexts specifically.

2.1.1 TPB in the context of early phase innovations

In light of the rapid innovative landscape characterising today's society, the TPB model has been used by several scholars as a fundament to investigate consumer adoption towards new technological innovations. For example, Chen & Huang (2016), have compared TPB with its' precursor TRA, as well as Davis (1989) commonly used Technology Acceptance Model

(TAM), in order to investigate which adoption theory that best can help to understand innovation adoption behaviour. Specifically, they focused on domestic technologies and conducted a study of 299 potential consumers of cleaning robots in Taiwan. The rationale for this study object was cleaning robots' potential to reframe the domestic roles normally associated with the family. Thus, it represents an innovation that implies complex psychological aspects that must be addressed. They suggested a number of conclusions based on their study and claimed that the TPB model had the highest accuracy to predict behaviour. Alongside their suggestion that global identity and lead-usership could provide additional understanding in their specific context of domestic innovations, they also concluded that the TAM model brought some valuable insights and could be considered as a natural extension to TPB. According to TAM, an individual's acceptance of new technology is determined by its' perceptions of the technology's effects of usefulness and ease of use, meaning that the intention to use the technology will increase if the individual sees it as an uncomplicated tool to fulfil its' needs (Davis 1989). Followingly, the findings suggested by Chen & Huang (2016), was that these factors influence the user's attitude towards the innovations and therefore should be considered as predeterminants to the original attitudinal factor in TPB. They also suggest a link between the original TPB factor subjective norms and formation of attitudes, which implies that the individual relies on its subjective belief of others when developing its' attitudes. Based on this, the researchers claim the importance of word-of-mouth activities and their potential to increase the technology adoption rate. This is motivated by the assumption that peer pressure and communication among consumers can have a convincing effect on following consumers decision to adopt similar innovation behaviour.

The combination of TPB and TAM was also evident in a study by Msaed, Al-Kwif & Ahmed (2017), who suggested that ideas from the Consumer Acceptance of Technology Model, further referred to as CAT, developed by Kuliwat et al. (2007), could be an additional model of use to increase the understanding of behavioural intentions. CAT builds on the same logic as TAM, but combines its' components with several effective reactions. They focused their study on consumers' switching intentions in the smartphone industry and compared to Chen & Huang (2016), they suggested a slightly contradictory perspective. Specifically, they suggested superiority of the TAM factors in relation to TPB, and that the TPB component of subjective norms had only limited impact on the consumers' intention to switch. Additionally, they found that the TPB component of attitude was mediated by the consumer's feelings towards the brand and thus indirectly had an effect on their intention to switch to a new smartphone. These

perspectives indicate that the character of innovation might imply different adjustments of the TPB model and therefore must be considered.

Other scholars have focused on the adoption behaviour to software products specifically. For example, Weigel et. al (2014) have contributed to the field based on a comprehensive meta-analysis, where they combine TPB with the diffusion of innovation model developed by Rogers (1962). This model considers key perceived characteristics of an innovation and the researchers suggests accordingly that TPB could be extended by components of relative advantage, compatibility, complexity, trialability and observability. According to the researchers, these components are crucial to understanding the adoption intention of a new information system. Furthermore, Vargas et al. (2018) studied the context of HR analytics and suggested a conceptual model based on TPB in combination with Rogers' (2003) innovation-decision process. They adopted a slightly different perspective by using the TPB concept to deepen the understanding of the former model's initial phases, which leads up to the decision to implement and further confirm an innovation. Followingly, they conclude that the components of the TPB framework are valuable to understand barriers or facilitators in the adoption of such complex innovations.

A third study that has focused on early phase software innovation was conducted by Yang, Lee and Zo (2017), who proposed the need of addressing factors of usability and the potential negative factors that are comprised to the adoption of specifically smart home services. In addition to concluding the powerful use of the original TPB factors, they identified that the mobility of the service, the aspect of security or privacy risk as well as the consumers' trust in the service provider are important contributors to adoption behaviour.

As these studies indicate, several attempts have been made to tailor the TPB framework to the context of early phase innovations that implies a certain degree of technological acceptance. However, other scholars have used TPB to address the adoption of early phase business model innovations, which rather implies a shift in the consumers' behavioural pattern, rather than focusing on the technological aspect specifically. The applicability of the TPB model in such context was demonstrated by Zhang et al. (2018) who have studied the adoption intention of electric vehicle sharing, further referred to as EV sharing, through the lens of intervention. The case of EV sharing was chosen based on the rationale that an increased adoption rate could help to address climate change, and that a limited understanding of consumer concerns have hindered

the service to reach its' full potential. In light of this, they were the first to extend the TPB model with the factor of *policy support*. They suggested policy support to have an influential impact on both attitudes and subjective norms. Followingly, they claimed that policy support is necessary for the proceeding development of the EV sharing and that initiatives that improve the legal landscape and the convenience of using the service are important. Additionally, they suggested that policies that shed light on the sustainability issue are crucial to stimulate the adaptability of the service. Thus, they illustrated how attitudes can be influenced by actions of external actors and emphasised that social pressure to adoption increases as the popularity grows, which emphasises the connection to TPB's original components of subjective norms. However, even if policy support is a key contributor in their model, they also stated that the original factor of perceived behavioural control was seen as the foremost important factor in this context. This factor was measured as the individual's perception of confidence in attending EV sharing and its' perception of the service's ease of use. The relevance of perceived control in carpooling contexts has also been suggested by Bachmann et al. (2018) who claimed that this component is one of the most important for both drivers and passengers. Additionally, they concluded that this perceived behavioural control is influenced by the user's dispositional trust towards carpooling.

These two cases of carpooling draws on two main conclusions that are of importance for our study. Firstly, the idea of stimulating early phase innovations by policy support sheds light on the power of external institutions to engineer the individual's beliefs. As our study investigates how the industry affects the behavioural intention held by consumers towards an early phase innovation, this perspective might provide useful insights to how TPB can be applied to our context. Secondly, they also initiate the relative importance of perceived behavioural control compared to the other factors. However, both definitions used in these two studies compile a narrow scope compared to how this component is described in the original model of TPB and they do not consider the direct link between perceived behavioural control and the behaviour itself. Moreover, the findings of these studies rely on cases where the product/service the behaviour pertains to is accessible to the performer. Therefore, when investigating an early phase innovation that is not yet on the market, these conclusions have to be revisited as they the contextual difference might have implications on their evidence in such cases.

2.1.2 TPB in the context of stimulating sustainable behaviour

In addition to the above-mentioned cases of early phase innovations, the TPB framework has also been used to investigate the drivers of pro-environmental behaviour in less disruptive contexts. Similar to the EV sharing case, these studies are often conducted with the ambition to develop tools that can stimulate and influence behaviour. For example, Macovei (2015) have studied the underlying factors that motivate consumers to act pro-environmentally in the case of energy conservation. This study derived from the fact that consumers themselves do not always see the correlation between individual effort and contribution to the overall attempt to solving environmental problems. Followingly, he proposed that an increased understanding of the underlying factors of pro-environmental behaviour could be used as a tool to find out valuable ways of convincing consumers to make more environmentally friendly choices. The study contributed to the field of TPB by adding a specific variable of Schwartz's Norm Activation Theory (NAT) (1997), which is the consumer's awareness of the consequences and need of the behaviour. This is, according to Macovei (2015), an important determinant to consumers' pro-environmental behaviour. Macovei measured whether individuals perceived themselves to be aware of the importance of energy conservation, the need to reduce energy consumption and whether they described themselves as concerned about climate changes and the consequences of global warming. Overall, an individual that had high perceptions and concerns on those determinants also showed a strong intention to behave in a pro-environmental manner.

Additionally, Rex, Lobo and Leckie (2015) have concluded that internal ethics and moral intensity makes up important extensions to TPB when investigating consumer motivation to adopt sustainable practices. Based on a marketing perspective, they claimed that such practices are voluntary and that they arise from the consumer's motivation, availability of information and their knowledge about the situation. They further used this finding to justify that marketers and policymakers must encourage consumers to behave in a long-term sustainable way. Therefore, the findings from this study were that internal ethics was the strongest determinant. Based on this, the researchers the implications of this study for marketers and policymakers specifically and suggest that those are having an influential power to impact consumer behaviour by addressing the individual's ethical reasoning.

Building further on the perspective that institutions can stimulate environmental behaviour, the case of China has been specifically studied by Wang et al. (2018). In their study, they explored the case of green hotels in China and suggested that the TPB model could be better applied if it was extended with the perceived consumer effectiveness and the consumer's environmental concern as antecedents to their attitude. According to the researchers, both of these factors influenced the consumers' attitude and thereby also their intention to visit green hotels, where perceived effectiveness was raised as the most influential component. Furthermore, the researchers discussed the two adding factors and suggested that the context of China was particularly important to consider when arguing for the framework's explanatory power. Specifically, they related this to the fact that Chinese consumers have gradually increased their awareness of environmental degradation, which was considered a result of Chinese governmental actions. This means that the government's initiatives, such as environmental education and financial incentive programs, that have shown to increase the Chinese consumers' environmental concerns are not transferable to a general context, due to the novelty of Chinese consumers' environmental awareness. When discussing the other factor, consumer perceived effectiveness, they claimed that Chinese consumers' utilitarian and rational mindset implies that they base their behaviour on whether they perceive they will actually contribute to a more sustainable society through their action.

2.1.3 Summary of previous applications of TPB

Based on this review, it is clear that many applications of the TPB model have been made and several extensions have been suggested to increase its' applicability to specific contextual situations. Scholars have attempted to adjust the theory towards more recent innovation contexts, in order to explain consumer behaviour. When considering technological innovations specifically, the findings can be summarised to the general conclusion that TPB could be better explained by adding different perspectives from acceptance theories. Very often, those additions are centred around the impact of communication towards the consumer, as it highly affects their understanding of the new technology's advantages and simplicity. In terms of less technological innovations, where the innovation rather emerge from an unfamiliar business model that implies a fundamental shift in consumers' behavioural patterns, previous studies instead highlight the importance of perceived behavioural control. In this case, policymakers were suggested to increase the adoption rate to such new behaviour, through policies directed to change the behaviour accordingly.

The influence from institutions, marketers and government has been discussed repeatedly in several of the studies outlined above. Especially, such actors' are suggested to have the ability to engineer behaviour to become more pro-environmental, often by providing information that can activate specific norms or attitudes. The original TPB model's inability to fully explain those situations has led to several suggestions on how to combine or extend the framework. Building on the same logic, it also seems as the original TPB model is insufficient to explain the context in the focus of this study. Even if many similarities can be found in the extended studies presented above, we believe that a complementary perspective that extends the understanding of the industry itself is necessary. This is because the previously presented models lack an explanation of how the actions taken by the industry, including governmental institutions, will impact consumers' behavioural intentions towards the early phase innovation. The following section of the literature review will, therefore, address the phenomenon of industry shifts and the potential responses from various industrial actors.

2.2 Industrial shifts

Many scholars have researched the field of industrial shifts and tried to answer what drives the process of disruptive innovation (Christensen 1997; Anderson & Tushman 1990; Klepper 1997). The fundamentals of how new industries emerge can be found in the concept of product life cycles and Klepper (1997) draws on conclusions by scholars such as Williamson (1975), Clark (1985), Utterback and Abernathy (1975) to explain how market structures and innovation evolve through three distinct phases before it transforms into a new industry. The first phase is characterised by high uncertainty, intense innovation and unspecified preferences in the market. The stabilisation of products begins in the following growth stage and matures further in the third and final stage, which contributes to that a dominant design or product standard can be set. However, when the next generation of innovation emerges, this new standard might be challenged by new products. When industrial shifts have been studied from the perspective of technology substitution, findings indicate that two conditions have to co-exist for a technology substitution to take place (Paap & Katz 2004). These are that consumers have to possess an unmet need within a dominant driver and that the current technology must be incapable to meet the very same need. A driver is explained to be a performance characteristic which is highly affecting the choice of consumers, as it is considered to be a large part of the value proposition.

The origin of drivers can differ, where one reason can be that the previous driver has matured. Another reason for a shift in a dominant driver can be that the environment surrounding the technology changes, which can subsequently lead to the creation of new drivers. A change in the environment can, for example, be a change in the economic or regulatory environment or closer connected to the customers through a change in activities, goals or preferences. In some cases, the old technology is able to adapt to changed environmental conditions, but in others, it is incapable to do so. In the latter scenario, a need for a new technology occurs, in light of the new performance driver that surfaced as a consequence of the changing environment (Paap & Katz 2004). Nevertheless, many different drivers can force an industry towards a radical shift, where changes in regulatory, geopolitical shocks, deverticalisations or disintermediation of businesses, shifts in consumer preferences or new competitive landscapes makes up a few examples (Hamel & Välikangas 2003).

Thus, industrial shifts sometimes push incumbents to follow the new industry development and many scholars have previously emphasised that innovation is crucial to uphold the competitiveness in a technology changing environment (e.g. Johnson, Christensen & Kagermann 2018; Nagji & Tuff 2012). However, scholars have also suggested alternative strategies on how to respond to new technology. For example, incumbents can choose to not follow the industry development (Adner & Snow 2010). In accordance to our study, this is of particular importance, as it may induce that industry actors with a certain degree of bargaining power could impact the development of the early phase innovation that aims to disrupt the traditional industry standard.

2.2.1 Responses to industrial shifts

According to Adner and Snow (2010), the dominant view is that technological shifts often implies that incumbents must execute a transition to the new technology in order to secure its survival. However, this assumption requires that the traditional way of performance will become obsolete while the new technology matures, which is not always true. Drawing on several examples from economic history, the researchers instead highlighted that incumbents could consider a rational decision to stay with the traditional industry standard. Such strategic decisions can be successful in cases where macroeconomic forces are of higher importance, than the new technology's superiority. As an example, Adner and Snow (2010) highlighted the scenario where policymakers chose to support traditional industries and allocate resources to

motivate improvements for incumbents to transition the existing business into a more sustainable performance. Thus, the dynamics between policymakers and industry actors is evident also through this theoretical perspective.

The link between policymakers and industrial development have also been studied specifically in the context of China. For example, Aghion, Dewatripont, Du, Harrison & Legros (2015) studied how industrial policies and productivity growth relate and found that sectoral policies that encourage competition may have positive implications for productivity growth. According to the researchers, policymakers can initiate so-called competitive-friendly policies that support innovative, younger and more productive firms to challenge the current industry, and thereby stimulate the productivity of the overall sector. Such policies can be in the format of taxes or other subsidies, loans or tariffs. Similarly, Howell, He, Yang & Fand (2016) have found that subsidises is a fruitful strategy to help firms to survive. This finding has been further explored by Qu and Harris (2019) who extended their study to also consider whether political links had any implications for firms' survival potential, referring to links with either central, provincial or local government. Accordingly, they conducted a comprehensive study of different types of firms in China, including both state-owned enterprises (SOEs) and private-sector firms. Adding to the conclusion made by Howell et al. (2016), Qu and Harris (2019) showed that firms with both financial assistance and political links to central or provincial governments had superior conditions to survive. In addition to this, the study also confirmed the previous finding that firms with financial assistance from the government are less likely to face hazards or to fail. Thus, this puts lights on the role of the government and its' influential power to determine the direction of a specific industry. According to Qu and Harris (2016), this applies specifically to China and they use this as an explanatory case where policymakers historically have supported "strategic industries" through large subsidies and tax incentives to finance competence enhancing learning-by-doing activities in firms to survive the more competition intensive environment.

However, while the above studies have been focused on the power of the government, other scholars have suggested that the government can also be a victim of the industries' lobbying activities. For example, Deng, Hu, Huang, Pray, Jin & Li (2017), claimed that governmental policymakers are often influenced by economic interest groups, who have certain economic or attitudinal interests to uphold. In a study focused on the agribusiness in China specifically, Deng et al. (2017) investigated how managers' attitudes toward genetically modified organism

(GMO) technology correlated with their investments patterns, as well as with political lobbying activities. They limited their study to maize and rice actors along the supply chain and found that the majority of the Chinese managers in the agribusiness industry were opposing the adoption of GMO. Managers' attitudes were mainly based on their expectancy of profit loss, where those with high concerns were shown to be most likely to invest in biotechnology R&D. Overall, one-third of the firms of the study had invested in R&D related to biotechnology. Furthermore, while almost all of the studied firms expressed their dissatisfaction with the government's GMO supporting policies, only 13 % of the managers had been engaged in lobbying activities aiming to change those policies. However, the researchers did not find any correlation between the managers' profit loss expectation related to GMO and their lobbying activities. Deng et al. (2017) conclude their paper by emphasising that the government needs to educate the industry and the public if they should be able to promote the development of GM technology. According to them, the agribusiness' reluctance, as well as consumers' potential negative concerns, may cause major implications for the innovation to succeed according to the government's desire.

2.3 Towards an extended framework of TPB

Putting this together, it is clear that there are many interrelations between, on the one hand, consumers' behavioural intentions and, on the other, the industry, that must be considered when analysing the case of industry shifts and early phase innovation. As discussed above, the TPB model has historically been considered useful in understanding or predicting behaviour, and especially so in situations where the behaviour can be performed in reality by the individual. However, the criticism has more recently increased and TPB has been questioned for not taking unconscious influence on behaviour into account (Sheeran, Gollwitzer & Bargh 2013). The TPB has therefore been in focus for several innovation studies before, and many scholars have attempted to complement the model with various additional components. Despite this, the answer to this study's research question cannot be found in their attempts, why we want to suggest an alternative extension, explained below. A central reason to this is that in the case of early phase innovations, the consumer's behavioural intention is highly preliminary because it is based on beliefs that he or she cannot fully contextualise and justify. This is a logical effect of the fact that the innovation is not yet accessible.

Furthermore, the literature review has shown that institutions, such as incumbents of an industry as well as the government, can act in a way that activates or stimulates those factors underlying an individual's intentions. By considering aspects such as governmental impact, industry response and consumer perceptions, this extended framework provides an additional way to analyse how macro, meso and micro perspectives ties together. Accordingly, our ambition is that this framework should increase the understanding of consumers' intentions towards early phase innovations and to how the industry will influence these intentions. Due to the connection between actions of policymakers and industry actors, where policymakers have both shown to be influencing (Aghion et al. 2015; Howell et al. 2016; Qu & Harris 2016) and influenced by the industry (Deng et al. 2017), we will in this study consider their individual impact under the same concept; industry impact.

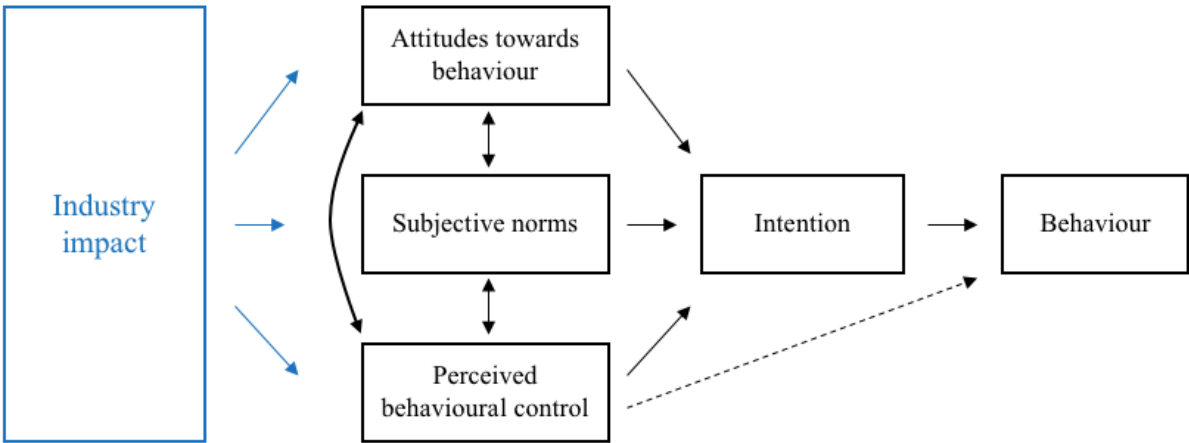


Figure 2. Preliminary framework

3 Methodology

3.1 Research Approach

The main purpose of this research was to gain and convey an understanding of the relationship of the industry's impact on the consumer behavioural intention towards an early phase innovation. This was done through an investigation of previous studies on consumer behaviour towards early phase innovations and pro-environmental innovations, as well as previous studies concerning industrial shifts and the responses following. The insights from the literature review generated a preliminary framework, which was further tested through an empirical study of actors in the industry to which the chosen early phase innovation belongs. In line with the exploratory objective of this study, and the complex characteristics of the research question, a qualitative research design was chosen. Our research approach when serving this purpose was of the increasingly popular abductive approach. The most common research approach has historically been induction and deduction. Induction implies a research approach where data is collected first, which is later used in an attempt to create new theoretical perspectives. A deduction is contrarily described as firstly choosing a theory from which hypotheses are constructed, followed by a data collection aimed to test the hypotheses (Alvesson & Sköldbberg 2009). Both induction and deduction have been questioned out of various reasons (Bryman & Bell 2015), why abduction has surfaced as an alternative (Alvesson & Sköldbberg 2009). The abductive approach is described as combining elements of the two dominating approaches, where the possibility to go back and forth between theory and empirical findings is a describing characteristic. When using an abductive approach with an iterative process, it is possible to both confirm the existing theory and suggest new theoretical perspectives (Bryman & Bell 2015), which was done in the line of this study.

3.2 Research Design

One of the most common research designs within qualitative research is the case study, which could be partly explained by the benefits of using a case when requiring in-depth analysis and a need for understanding contextual factors (Yin 2009). Stake (1995) means there are three different types of case studies to choose from. These are intrinsic case studies, instrumental case studies and multiple case studies. Intrinsic case studies aim to investigate details of a specific situation, and not to provide insights to a generic research question. Of this reason, this was not a relevant research design for this study. Instrumental case studies are more focused towards approaching a generic question, which applies for multiple case studies as well, why we found those approaches more reasonable to consider. Multiple case studies imply that the researcher has studied several different cases and weighed them together to provide insights to a generic occurrence. However, as described in the introduction, the case of cellular agriculture in China has been considered to be one example of a research object in line with what the research question intends to answer. This implies that neither a multiple approach is applicable. An instrumental case study is described as studying a generalisable case to answer the research question (Stake 1995). As previously stated, the purpose of this study is to investigate the impact industrial actors have on consumers' behavioural intention towards an early phase innovation. Accordingly, the Chinese consumers' behavioural intention towards the early phase innovation of cellular agriculture can be considered a specific instrumental case that aims to explain the role of the industry's collectivistic perception and interpretation. Therefore, we chose to conduct an instrumental case study, where the agricultural industry in China, broken down into the meat industry and the dairy industry, serves as the instrumental case to approach the research question.

3.3 Selection of case

It was considered important to delimit the scope of the study from a geographical perspective since the study object in itself presented a wide area to research. Further below, it is explained why the case cellular agriculture was chosen as the focal early phase innovation, and why the Chinese market was chosen as a suitable market to study.

The reason to why cellular agriculture was chosen as the early phase innovation in focus was twofold. Firstly, the stage of development that the cellular agriculture movement currently can be found in, serves as a suitable stage for a study like this to take place. The technology has emerged and developed the last decade, and the number of companies currently working on realising their products is growing. However, the cellular agriculture products have not yet reached the market, and the knowledge in consumer groups is limited but existing. Secondly, the food industry is one of the world's largest industries, and the innovation history within is mainly dominated by incremental innovations, why the effects of a potential cellular agriculture disruption would be significant. Therefore, cellular agriculture presents a suitable, but also interesting early phase innovation to study. Furthermore, the Chinese market for meat and dairy has been growing extensively in the last decades. Before this, Chinese meat and dairy consumption have been relatively small in regards to the size of its' population. Therefore, the consumption habits of Chinese consumers are characterised by a novelty, which might be an advantage when evaluating consumer attitudes. Also, the consumption change has happened extremely fast, and the Chinese market's ability to leapfrog has been a contributing factor as well. However, the main reason to why China was chosen as the focal market was its' size and importance for the overall world economy. In short, we found it both interesting and reasonable to investigate the Chinese consumer market because of the development of meat and dairy consumption, as well as the importance and potential impact of the Chinese economy.

3.4 Data Collection Method

In qualitative research, there are four methods for collecting data, and it is common to use several data sources (Creswell 2013). The data collected in this study can be divided into primary and secondary data where the primary data consists of qualitative interviews and the secondary data consists of industry reports and surveys. The choice of using these types of data sources and the execution of the collection will be explained further below.

3.4.1 Primary data

One of the most common and important sources of data in case studies is interviews (Yin 2009). As the aim of this study was based on investigating the characteristics of an ongoing development, conducting interviews did not only serve the purpose of approaching the

complexity of the implications as such, but also validating the direction of development. Furthermore, there are two different types of interview setups, both frequently used in qualitative research, which is semi-structured and unstructured interviews. Unstructured interviews are described as interviews where the researchers solely rely on notes as guidance, which makes the interview resemble a normal conversation more than an interview. Semi-structured interviews, on the other hand, is described as conducting the interview in accordance with a pre-determined interview guide, which can be complemented by follow up questions as the interview proceeds (Bryman & Bell 2015). In this study, semi-structured interviews were held. The reason for choosing this type of interview was mainly justified by the possibility to let the respondents lead the conversation to areas where he or she had most experience from, thoughts about and insights within (Easterby-Smith et al. 2015). The abductive and exploratory approach of this study made the flexibility that this sort of data collection provides highly valuable. Due to this flexibility, in combination with the iterative process, undiscovered perspectives and topics were allowed to surface during the interviews and allowed further investigation throughout the following primary and secondary data collection.

3.4.1.1 Sampling strategy

In qualitative research, there are multiple sampling strategies to choose from. The sampling of respondents in this study was made through a mixture of strategies, that all aimed to simplify the process as well as raise the likeliness of successfully responding to the research question. Firstly, a purposive sampling strategy was applied. A purposive sampling strategy is described as a sampling technique where the researcher relies on his or her own judgement when selecting respondents (Bryman & Bell 2015). In relation to the research object's novelty and newness, the sampling of respondents had to be made on the basis of up-to-date knowledge about the chosen case's development, which we acquired during the initial literature review and secondary data collection. That, in combination with the relatively small population of informed and knowledgeable potential respondents, justified a purposive sampling. Furthermore, a convenience sampling strategy was used, complemented by a snowball sampling method. Convenience sampling, described as sampling respondents partially based on accessibility, often occur as a consequence of certain restrictions the researchers are subject to (Bryman & Bell 2015). In the case of this study, the restrictions were several, where the geographical distance between the researchers' location and the research object was one, although it has been mitigated and handled as described in *conduction of interviews*. Moreover, a snowball sampling is described as using the networks of already recruited respondents to recruit more, and through

them receive a niched and adjusted sampling (Bryman & Bell 2015). All respondents were asked to recommend further relevant respondents, which has been taken into consideration in the consecutive sampling.

In line with these sampling strategies, we tried to sample respondents from different parts of the industry and reach a width of perspectives in the interview study. Even though the geographical focus of our study has been China, the recruitment of respondents has not solely been focused to the Chinese market. This was because the main development of the cellular agriculture movement takes place in other parts of the world, whereas the perspective from this crucial part of the research object was not evident in China.

3.4.1.2 Conduction of interviews

All interviews were conducted via digital communication solutions, with regards to the geographical distance between us and the research object. There are both positive and negative consequences of conducting interviews via telephone or internet. From a positive point of view, one can argue that telephone interviews simplify the process of successfully finding respondents since it reduces the needed level of commitment and effort connected to the interview (Easterby-Smith et al. 2015). Nor the interviewer or the respondent have to invest money or time into travelling to a certain location for the interview to take place (Bryman & Bell 2015). However, one negative side of not being face-to-face with the respondent is a potential loss of interaction in the form of body language and facial expressions, which can result in a reduced understanding of the overall meaning of what the respondents are implying (Easterby-Smith et al. 2015; Bryman & Bell 2015). To mitigate this, and to reduce the impact of it, we strived for including video connection when executing the interviews, which was successful in 5 out of 8 cases. However, this is generally of more relevance when the research requires an in-depth understanding of the respondents' expressions and underlying feelings (Bryman & Bell, 2015). In line with the purpose of this study, where we aimed to investigate the industrial characteristics and not the respondents' personal expressions, the aspect that the video set-up did not work in 3 interviews was not considered a risk for the overall quality of their contribution. Furthermore, with the allowance from respondents, the interviews were recorded and transferred to a digital platform. The recording is a commonly used method when data collection consists of interviews, as it enables the interviewer to focus on leading and facilitating the discussion, rather than taking notes and memorising what is said (Creswell 2013; Yin 2009).

Table 1. List of respondents

Person	Organisation	Area of expertise	Length
Respondent 1	JUCCCE	Chinese consumers	33 min
Respondent 2	AllFlex	Chinese farming market	31 min
Respondent 3	Sweden FoodTech	Cellular agriculture	35 min
Respondent 4	JUST	Cellular agriculture	35 min
Respondent 5	Yili Group	Chinese conventional dairy industry + innovation	33 min
Respondent 6	Brinc	Cellular agriculture	40 min
Respondent 7	Avant Meats	Cellular agriculture	43 min
Respondent 8	Nestlé	Conventional food industry (focus on agriculture)	28 min

3.4.2 Secondary data

Collecting secondary data can serve several purposes. Firstly, it can be a time-saving method in comparison to the collection of primary data, as the process of collecting data from secondary sources is associated with a more efficient process. Secondly, it can serve as an important and qualitative complement to primary data. Lastly, secondary data can provide perspectives and information hard to access through primary sources, such as historical aspects and statistics (Easterby-Smith et al. 2015). However, there are challenges and risks associated with using data from secondary sources, the main being that the data was originally collected for other purposes than the one connected to the concerned study. Consequently, the researcher collecting secondary data have to pay extra attention when interpreting it, and be careful not to misuse the information (Easterby-Smith et al. 2015; Bryman & Bell 2015). In the case of this study, these measures were taken into consideration, and the source itself was evaluated with extra attention in all cases of secondary data. Facts were cross-checked to the extent that it was possible, as well as the quality of the source, before included in the empirical section of the study. One purpose served by secondary data in this study was to give the reader a clearer picture of the development of the early phase innovation in focus; cellular agriculture. However, due to the novelty of the development, sufficient industry reports have not been accessible.

Therefore, in order to present the market development of cellular agriculture, we have compiled industry data in appendixes, sourced from carefully chosen sources, such as company databases, LinkedIn and industry organisations. The choice of which data to include has been based on certain requirements explained in the devoted section in empirical findings.

3.5 Data Analysis

The process of data analysis of this study began with transcribing the interviews. Creating transcriptions of interviews eases the process of analysing interviews content in hindsight, and the method is in most qualitative studies considered a need that needs to be fulfilled (Bryman & Bell 2015).

The data analysis in this study was performed iteratively, in line with the abductive approach of this research (Bryman & Bell 2015). One of the most common data analysis methods within qualitative research is called pattern matching, which implies that the researcher identifies a predicted pattern that later compares to an empirically based one (Yin 2009). This method proved fruitful, why it was applied to this study. A predicted pattern was identified through the literature review conducted for the creation of the introduction, in combination with the formulation of the preliminary framework. The predicted pattern was compared to the empirically based pattern, which in turn derived from coding. At first, the data was divided into categories of topics frequently brought up during interviews. These categories were the following; the Chinese meat and dairy consumption, perception of industries and cellular agriculture. The categories were in turn broken down to smaller components, in order to simplify the analysis, as well as the reader's understanding. Furthermore, the information was analysed together with the secondary data, after which revision and adjustments were made to the preliminary framework, which led to a final framework presented in the analysis section.

3.6 Quality of study

Validity and reliability are two very important aspects when discussing the methodology for scientific research. These concepts are considered to be the foundation for justifying why the research should be considered truthful and useful. However, scholars have questioned whether

the definitions of validity and reliability can be used in the context of qualitative research, as those aspects are more suitable for a quantitative context (Bryman & Bell 2015). Consequently, there are various definitions of validity and reliability in connection to qualitative research. The definition of validity is to what extent the study has provided and generated results in line with what was originally intended to be studied (Easterby-Smith et al. 2015). Reliability is described as the extent to which the measurements of the study are to be considered dependable and accurate (Bryman & Bell 2015). However, embedded within this and most qualitative research is the difficulty of measuring validity and reliability, due to the connection to the ontology of relativism and nominalism. In the light of this, we chose to adopt the framework created by Guba & Lincoln (1994, cited in Bryman & Bell 2015) when addressing these issues, using the concepts of credibility, transferability, dependability and confirmability instead.

3.6.1 Credibility (Internal validity)

Credibility, comparable to internal validity, concerns the extent to which the study has been conducted in accordance with existing rules. Highly related to this is the researcher's effort to ensure that their interpretation of collected data is aligned with the respondent's actual view of the topic (Guba & Lincoln 1994). As qualitative studies are highly connected to understanding the social context of the research object, it is of utmost importance to ensure that research has been conducted through a rigid and well-planned process, in order to enable readers to assign high credibility to the findings (Bryman & Bell 2015). By reason of the scope of this study's research object, it was of high importance to plan the process thoroughly. As a first step, we took part in a large amount of secondary data to learn more about the meat and dairy industry, both on a global level and a Chinese context. This was done to ensure that we had an adequate understanding of the context that has been the aim of the investigation. During data collection, we did not only make efforts to expand their understanding of the context, but also made sure to revisit the one generated from the collection of secondary data by asking respondents to confirm or review it. Furthermore, in order to ensure trustworthiness in the interpretation of primary data, two practices were applied. Firstly, if any statement from a respondent ran the risk of being misinterpreted, the concerned respondent was given the possibility to review the transcript. Secondly, all statements depending on factual sources were verified in hindsight.

3.6.2 Transferability (External validity)

Transferability, comparable to external validity, refers to the researchers' ability to describe the context that is being investigated. For readers to fully evaluate the results of a study, and whether these can be used in other contexts as well, he or she must be given a comprehensive description of the context (Guba & Lincoln 1994). In order to address the transferability issue, the background of the interview respondents varied generously. We strived to collect data from as many parts of the industry as possible, ranging from companies representing the conventional industry to innovative front of both meat and dairy. Because of the research object's size and complexity, this was seen as an important measure to emphasize the contextual environment of this study. Lastly, we decided to include a generous amount of quotes in the empirical findings, in order to make it possible for readers to make their own interpretation of the primary data.

3.6.3 Dependability (Reliability)

The concept of dependability is comparable to the reliability and concerns the researchers' ability to provide the reader with distinct information about the methodology and problematization of the study (Guba & Lincoln 1994). Hence, it is closely connected to the information provided about the choices the researcher have made throughout the process (Bryman & Bell 2015). To strengthen the dependability of this study, the aim was to construct a thorough and omniscient methodology section. Whenever given the possibility, we have also welcomed and listen to feedback about the choices made. Inspiration was also taken from prominent and well-known scholars within the field, to raise the dependability of this study.

3.6.4 Confirmability (Objectivity)

Confirmability, comparable to objectivity, concerns that the researchers took measures to avoid letting personal views and interest affect or interfere with the results (Guba & Lincoln 1994). As stated earlier, all hesitant or unclear data from the interviews was validated through other sources in retrospect. Moreover, we strived for conducting interviews together as much as possible. Most importantly, however, we made sure to follow the concept of triangulation. The concept of triangulation implies that the researcher has used several data collection methods, in

order to raise the strength of the study (Eisenhardt 1989). In this study, the triangulation mainly took the form of combining primary data with secondary data.

4 Empirical Findings

The following section is divided into two main parts; secondary data and primary data. The secondary data pertains to explain and deepen the reader's understanding of this study's case, as well as present useful data which will be capitalised in the analysis to follow. The primary data consists of data from the interview study, which is divided into three categories deriving from the topics frequently spoken of during the interviews, namely; *The Chinese meat and dairy consumption, perception of industries and cellular agriculture*.

4.1 Secondary data and case description

4.1.1 The emergence of cellular agriculture

Cellular agriculture refers to the field of artificially producing agricultural products, meaning that scientists use culture media to provide cells with nutrition and different growth factors in order to start a self-replication process. There are two categories into which the field of cellular agriculture can be divided; cellular agriculture and acellular agriculture. This categorisation comes out of two different production techniques, which both seek to produce animal products without the environmental and animal ethics problems that conventional agricultural industries are associated with (Kahn 2018).

The category of *cellular agriculture* includes cell-based meat, seafood and wildlife products (Cellular Agriculture Society, n.d), which are all based on tissue engineering on living or once-living cells, described as growing tissues and cells outside of the animals. Further on, we will refer to this category as the category of *tissue engineering* or the product segment of *cell-based meat*, in order to avoid confusion with the overall industry segment. When cells replicate, they divide into new cells and develop into tissue that is identical to those from conventional livestock (Khan 2018, Mattick 2018). However, as it is very complex to create meat with steak-like structures, the most of the companies in this field are focusing on products such as burgers, nuggets and other based on minced or sliced meat (Dance 2017). *Acellular agriculture*, on the

other hand, refers to the process of using microbes, such as yeast, to grow animal products. This category will further be referred to the name of the production technique enabling these products, *fermentation engineering* or the product segment *cell-based dairy*. This process is used for cell-based dairy and egg white and enables a development that completely excludes the animal from the value chain (Khan 2018, King 2018). The number of startups that have entered the field of fermentation engineering is still relatively few compared to those focusing on meat (Appendix A), despite the more simplistic process of producing cell-based dairy. The reason to why this is a more simple process is that 95 % of the protein ingredients in milk comes down to only six different kinds of casein and whey, while the rest of the ingredients are not nutritive or needed for humans at all (Dance 2017).

The overall industry segment of cellular agriculture has in fact been around for longer than most might think, as the first product in the form of synthetic insulin was released in 1978. Although most might not perceive this as an agricultural product, it marked the beginning of producing animal-free products that previously required the involvement of animals. Nevertheless, apart from the creation of a dairy-related protein pertaining to cheesemaking created in 1990, the cellular agriculture development since then has been dominated in the field of cell-based meat. The first peer-reviewed study on a cellular agriculture product was released in 2005 by Edelman, McFarland, Mironov & Matheny, focused on tissue engineering and the production of cell-based meat. The first cell-based meat product made possible was a burger created in 2013 by the Dutch researcher Mark Post, later the founder of Mosa Meats. In conjunction with this release, a showcase was held in London, where the product was tested live on television. Since then, several other startups within the field of cellular agriculture, specifically in the cell-based meat segment, have been founded and started their journey towards market entry (Cellular Agriculture Society, n.d). The market for cell-based meat and cell-based dairy is still waiting for its' first commercial market release.

4.1.2 The market development of cellular agriculture

To further understand the industrial direction, the market development has been analysed, with the focus on mapping the landscape of the two categories it contains, cell-based meat and cell-based dairy. The categorisation in this market analysis is based on that cell-based meat includes all companies that aim to develop products within meat, poultry and seafood. Consequently,

the category of cell-based dairy includes all companies that aim to develop products within the dairy sector, for instance, milk, cheese and eggs.

4.1.2.1 Number of companies

The number of companies in the cellular agriculture at large has increased significantly during the last couple of years. When comparing the two categories, companies developing their products through tissue engineering have seen a drastic increase in competition. The first cell-based meat companies were funded in 2011, two at that time. This number is as of today up to 26 companies, where 19 out of the 26 was funded from 2017 and forward. A similar development cannot be found in the segment of cell-based dairy, where the number of companies adds up to five in total. Interestingly, the companies working to develop cell-based dairy products were all except one founded relatively early compared to the cell-based meat companies. Moreover, the geographical location and home market for a majority of the companies in the cellular agriculture field overall is the United States, although several startups in other parts of the world have been founded the last couple of years (Appendix A).

4.1.2.2 Investments

A crucial aspect of the early phase in innovation processes is the challenge of attracting enough investments to fund the realisation of the innovation. Succeeding with this increases the possibility to do so significantly, and the invested amount per category can, therefore, be a sufficient way to examine the development of each category.

Although the available data is limited, the cell-based meat movement has attracted a significantly higher number of investments, compared to cell-based dairy. The appendix shows the invested amounts in 13 of the 26 previously mentioned companies within cell-based meat, and the total number adds up to over 290 million dollars. As for cell-based dairy, the invested amount for three out of the five previously mentioned adds up approximately 65 million dollars. Interestingly, in both categories, there is one company that has attracted a large part of the total amount, which is JUST in cell-based meat and Perfect Day in cell-based dairy, with 220 million and 61 million received individually (Appendix B).

In addition to this, there are other investments activities worth mentioning. An interesting trend is that two of the largest American conventional meat companies have invested in cell-based

meat companies the recent years. Tyson Foods, the largest conventional meat producers in the United States, has invested in two cell-based meat companies; American Memphis Meats and Israeli Future Meat Technologies (Tyson Foods 2019). Another large actor in the American meat sector, Cargill, has adopted a similar investment strategy, by funding the Israeli cell-based meat company Aleph Farms (Nelson 2019). On another note, the Chinese government agreed to a trade deal with Israel in 2017, aiming to simplify and increase trade of pro-environmental solutions for the agriculture industry (Rabinovitch 2019). Parallel to this, media have also acknowledged the government's ambition to reduce conventional meat consumption by 50 % by the year 2030 (Milman & Leavenworth 2016).

4.1.3 Research on consumer attitude towards cellular agriculture

Despite its' novelty, several studies have been conducted in order to investigate the consumer attitude and acceptance towards cellular agriculture. Worth to mention, however, is that all of them have focused significantly on cell-based meat. Bryant & Barnett (2018) recently published a systematic review of a selection of 14 peer-reviewed empirical studies on consumer acceptance towards cell-based meat. The selected studies show varying results in consumer acceptance, where some are more optimistic than others. In conjunction with the review, the authors also analysed factors influencing acceptance and patterns in consumer perception of the phenomenon of cell-based food. One identified pattern was the factor of familiarity, and how increased familiarity with cell-based meat was correlated with increased acceptance (Bekker, Fischer, Tobi & can Trijp 2017; Wilks & Phillips 2017). On the same note, Verbeke, Marcu, Rutsaert, Gaspar, Seibt, Fletcher and Barnett (2015) evaluated consumer acceptance towards cell-based meat by questioning focus groups, which showed that acceptance was higher towards the end of the focus groups when participants' understanding of the concept had been expanded. Similarly, studies conducted in line with experimental methodology showed that participants were highly affected by the information provided. If given more information about the environmental and health benefits made possible with cell-based meat, participants indicated higher acceptance (Verbeke, Sans & Van Loo 2015). A similar finding was made in another study, where participants' acceptance changed in line with the degree of positivity characterising the provided information (Bekker, Fischer et. al 2017). Moreover, the studies uncovered several common personal concerns participants had connected to this novel phenomenon. One of the most frequently occurring concerns was that cell-based meat felt a lot less natural as opposed to conventional meat (Marcu, Gaspar, Rutsaert, Seibt, Fletcher &

Barnett, 2015; Tucker, 2014; Verbeke, Marcu et al., 2015; Wilks & Phillips, 2017), also referred to as “real meat” (Bekker, Tobi & Fischer 2017). Another concern evident in several studies was the concern about the safety implications of cell-based meat. This was in some cases found to be linked to the above-mentioned unnaturalness, highlighting the scientific risks of growing food in a laboratory environment (Siegrist & Sütterlin, 2017; Verbeke, Marcu, et al., 2015). However, other studies showed examples of participants seeing potential benefits of cell-based meat from in the context of safety (O’Keefe, McLachlan, Gough, Mander & Bows-Larkin, 2016). On another note, some studies provided results of participants expressing concerns about the potential societal consequences of emerging cellular agriculture development. These concerns mainly circled around the following effect on the conventional agriculture industry, and the worsened conditions for traditional farmers. In these contexts, the potential social, cultural and economic losses were raised, but also the risk of depleting rural areas on the countryside (Bekker, Tobi et al., 2017; Verbeke, Marcu et al., 2015; Wilks & Phillips, 2017). Several other concerns were brought up in the review, as well as positive perceptions, that mainly had to do with avoiding slaughtering of animals, environmental benefits and potentially improved public health. Lastly, the author made sure to note that the studies review mainly evaluated consumer acceptance of European and American consumers (Bryant & Barnett, 2018).

Although the studies on consumer attitude towards cellular agriculture mainly have been focused on American and European consumers, there are examples of evaluating the attitude of Asian consumers as well. A survey study conducted to investigate the consumer perception of plant-based and cell-based meat alternatives of US, Indian and Chinese consumers was conducted earlier this year, with a database of answers from 3030 participants. In short, the survey results shows that the attitude towards cell-based meat is generally higher in India and China than in the US. Chinese consumers were found to be most positive, out of which 59,3 % found it very or extremely likely that they would purchase cell-based meat, whereas the same figure for India and US consumers were 48,7 % respective 29,8 %. A similar relation between consumer groups was evident in the question of knowledge of cell-based meat and familiarity to the concept, with the exception of Indian consumers being even more familiar than Chinese. In general, the study shows that previously unexplored markets regarding consumer attitude towards cell-based meat, in this case Asian markets, can prove to be more accepting than the home markets for a majority of the startups within this field (Bryant, Szejda, Parekh, Desphande & Tse, 2019).

Attempts to find research that evaluates the consumer attitude towards cell-based dairy have been made, without any success, as it, to the best of our knowledge, have not yet been conducted. Other scholars have acknowledged this research gap as well. For example, in a recent study, Saavoss (2019) claimed that she too was unsuccessful in finding studies on consumer attitudes towards other cellular agriculture products than cell-based meat.

4.2 Primary data

4.2.1 The Chinese meat and dairy consumption

4.2.1.1 The increased consumption of meat

In general, the respondents spent little time and focus on discussing the increase of meat consumption in China, mainly because this was seen as a relatively known development with one clear underlying factor. The respondents' answers shows that the most important reason for the increased meat consumption in China is the emerging affluence of the Chinese population, in contrast to that they have previously based purchasing decisions on what was available and affordable. Several respondents have argued that a large part of why meat consumption have increased so severely the last decades is due to inspiration from more experienced affluent countries. One of the respondents, Respondent 1, runs a movement called Joint US-China Collaboration for Clean Energy, which have in the latter years started to work intensively to change Chinese dietary habits. She is therefore highly knowledgeable in the field, and when she spoke about affluence as a driver to China's increased meat consumption, she claimed that:

“China's society doesn't know what a rich person's life actually looks like” (Respondent 1 2019).

As a consequence, the newly affluent Chinese people have taken inspiration from cultures of the Western world and people in general associate meat consumption with luxury (Respondent 1 2019). Other respondents, such as Respondent 6, the manager of the food tech program at Brinc, a food accelerator in Hong Kong, also assigns the increased meat consumption to the wealthier parts of the population. Compared to many other respondents, she also established a connection between the increased consumption of meat to the increased consumption of dairy,

meaning that consumers that recently increased consumption of meat in their diet also had a tendency to consume more dairy. The reason for this was claimed to be curiosity, and subsequently, a shorter distance, to adapting habits connected to Western cultures. However, as a following effect of the increased affluence, the same respondent also argued that this could lead to the opposite trend further ahead in time, referring to a decrease of consumption due to scepticism towards the meat industry. She also argued that citizens of the wealthiest parts of China, such as Hong Kong and Beijing, have seen an abundance of animal protein, and could therefore be more open to more sustainable solutions, such as plant-based and cellular agriculture.

4.2.1.2 The increased consumption of dairy

When we turned the interview focus towards the increasing dairy consumption in China, other underlying factors were emphasised as drivers by the respondents. Specifically, nutrition was brought forward and they suggested this to stand out from the increased meat consumption.

“If you would ask, let's say a consumer and China, like, why would they purchase milk, have it automatically just say it's nutritious. That's, that's the reason they purchase it” (Respondent 6 2019).

This view on the dairy development in China was supported by other respondents as well. Respondent 3, Founder of Sweden Foodtech, claimed in his interview that the increased dairy consumption can be explained by Chinese citizens' ambition to grow stronger, in comparison to Western countries (Respondent 3 2019). In addition, Respondent 2, who works as a business consultant at Alltech, a firm providing technological solutions to the agriculture sector, also supported this argument by claiming that Chinese dairy consumers have more functional incentives to their consumption compared to their Western counterparts. The same viewpoint was shared by Respondent 1 through the quote below, highlighting not only the nutritional value, but also the overall health considerations of Chinese dairy consumers.

“So a lot of people eat, a lot of older people eat a yoghurt a day, because they think ‘oh it's gonna help me digest” (Respondent 1 2019).

Also those respondents who represent the traditional industry, Respondent 5, Managing Director of Yili Innovation Center, and Respondent 8, Corporate Head of Agriculture at Nestlé,

said that the rationale behind the Chinese consumer's consumption of dairy is to include its' nutrition in their diets. When doing so, they also highlighted a key perception regarding the market for dairy and non-dairy alternatives of today, connected to the consumption in the Chinese market.

“And if you are now looking into this milk alternative, the nutritional, let's say footprints and the nutritional set up, you will see that it is absolutely through whatever, you are not possible to substitute the nutritional value and the nutritional content of one litre of cow milk to any other plant” (Respondent 8 2019).

“...many of the milk alternatives are not really a replacement of milk, it's fair to say if you look at the, for instance at the protein content and all these kind of things...” (Respondent 5 2019).

Even though there are several alternatives to dairy available for consumers to choose from, for example soy milk, oat milk and rice milk, they are according to these arguments not sufficient substitutes from a nutritional point of view (Respondent 5, Respondent 8 2019). The other respondents, that are not connected to the traditional industry to the same extent as Respondent 8 and Respondent 5, did not emphasise this as an issue specifically. Instead, they discussed the availability of plant-based products as a counter argument for the development of cell-based dairy, meaning they could indeed be a potential alternative preferred by consumers. In relation to cell-based dairy, these respondents believed that plant-based alternatives had a larger possibility to gain market share and grow in terms of consumer adoption the upcoming years (Respondent 6, Respondent 3, Respondent 1 2019). Thus, even if almost all respondents emphasised the nutritional value of conventional dairy as the main driver of consumption today, they had slightly different perspectives of whether consumer preferences would change in the future, and if conventional dairy could be substituted by plant-based products.

Many of the respondents also discussed how the Chinese government has contributed to the increased consumption of dairy. The common view was that the government has encouraged consumption based on the belief that the nutritional power of dairy could stimulate growth and make Chinese citizens taller, bigger and stronger. For example, Respondent 7, who is the co-founder and CEO of China's very first cell-based company Avant Meats, claimed:

“The Chinese government, I think they do encourage, at some point, that people consume more dairy products, namely milk, because they thought that is a step in the Western culture and it seems that people who are from the Western world seem to be taller. You know, bigger and something like that and they just thought like, ‘oh it must be the food’. So they actually encouraged a lot of dairy consumption in the first place” (Respondent 7 2019).

A similar point of view was taken by Respondent 5, who said:

“it is stimulated by the government, the Chinese government, that it will be good that Chinese people will drink more milk or eat dairy products” (Respondent 5 2019).

Adding to this, Respondent 1 also highlighted the Chinese government's role in supporting dairy consumption, by claiming that the government has taught consumers to believe that dairy contains magical ingredients which they are missing in their diet. The government's inspiration from Western cultures can thus be considered as one reason to why the dairy industry has flourished in China. Another reason is the fact that dairy is a cheap source to protein (Respondent 1 2019). Lastly, dairy products' novelty and relatively recent introduction was considered to be a third reason for the increased dairy consumption. As already outlined above, Respondent 6 raised this as being an underlying factor and claimed that the novel appeal of the dairy product segment creates an excitement that many consumers want to explore in general.

“Everybody wants to try it” (Respondent 6 2019).

The novelty of dairy products in China was brought up as one of the main arguments to that the market is not ready for a disruption in the dairy segment, which will be elaborated on and problematised further down below. Thus, to sum up on the differences between meat and dairy in China, the dairy industry was not at all perceived as threatened, while the meat industry was spoken about as a target for a change in the future even if the particular substitute was not evident.

4.2.2 Perception of industries

A point that was made by several respondents during the interviews was that even though the meat and the dairy industry might seem highly interrelated on paper, it does not have to be perceived so by the outside eye, especially when investigating people's general feelings towards the two. Respondent 6 argued that the meat industry often is perceived as a controversial industry, associated with slaughterhouses and animal butchering. The dairy industry however, does not come with the same associations, which can explain why the general resistance is less towards the dairy industry compared to the meat industry. Respondent 3 made the same point, while claiming that the general public does not seem to recognise the connection between the industries, and that dairy is often perceived as a kinder industry, than the meat industry. The general feelings towards the different industries seem to differ, which can also imply different incentive structures connected to its' irrespective output.

“But I think in general, there, let's say maybe their incentives towards dropping dairy products is very, very different than dropping animal protein. And I think it would be for more superficial or health reasons for other than environmental or animal ethics issues” (Respondent 6 2019).

The environmental impact of the agricultural industry was widely discussed during the interviews, and more specifically, the respondents were asked to make a comparison between the two industries in focus. Some respondents then concluded that even though the production cycles are similar on many points, the meat industry seems to be more frequently spoken of from environmental concernants. The connection between the industries, from an environmental perspective, was claimed to derive from the very first part of the value chain, namely the farming of cows. This was specifically discussed as an interesting bias, as problems associated with meat farming, water use, greenhouse gas emissions and use of antibiotics etc., are almost equally applicable to dairy farming, according to some respondents (Respondent 6, Respondent 3, Respondent 7 2019). However, on the same note, Respondent 8 pointed out that one should be careful about generalising between the environmental impact of industries, and direct more attention towards production systems, and whether these are locally or globally directed. Regardless of the degree of equality in terms of environmental impact between the industries, some respondents meant that a more important perspective lies in the perception of consumers. In line with this, they stated that even though the impact might be the same, consumers might not realise the connection between the industries. Therefore, they might be unable to recognise the severity of the dairy industry's environmental impact, in relation to the meat industry's.

Additionally, this perception's potential impact on consumption was highlighted, where the meat consumption development in Europe was used as an example by some respondents (Respondent 6, Respondent 3, Respondent 7 2019). To exemplify the lack of awareness surrounding the characteristics and impact of the dairy industry, Respondent 7 pointed to the rationales and justification process behind the decision of becoming a vegetarian. She meant that there are in most cases three individual or coexisting reasons for becoming a vegetarian, and these are animal compassion, environmental impact and/or health. When it comes to animal compassion, she meant that vegetarians that are consuming dairy are still upholding the industrial conditions dairy cows are treated under, where early death and stress are examples of such conditions. Moreover, seeing to environmental impact, she argued that greenhouse gas emissions and other environmental effects of farming are also still supported by the dairy-consuming vegetarian. According to Respondent 7, this is often without any rational considerations by the individual. Lastly, she meant that vegetarians have shown to possess high values of cholesterol, blood pressure and risk for chronic diseases, why health arguments are also hard to proclaim.

"...some of them they may be quite contented with just skipping meat and think that they've done everything they can, but not realising it, dairy is actually a very big problem on the three aspect of mentioned" (Respondent 7 2019).

Furthermore, some respondents elaborated on the perception of the industries' environmental impact in the eye of the Chinese consumer specifically. It was evident in the answers, that the environmental concern directed towards the food industry in general are not as emphasised in China as in other parts of the world. The reason for this is mainly the novelty of dairy and meat consumption, and the positive connotations that surrounds it. Both Respondent 1 and Respondent 5 said that dairy as a phenomenon had been introduced as something positive to the Chinese population. Breaking down what is perceived as positive, it has mainly got to do with the nutritional value spoken of above, which again has been pushed by the Chinese government (Respondent 1, Respondent 5 2019). In the light of this, several respondents said they did not believe the development of conventional meat or dairy consumption in China would decrease anywhere close in time, even if new technical solutions were introduced on the market (Respondent 5 2019).

“It's fair to say that in China, people are kind of happy that they can finally eat meat, because not so long ago, they did not have it, but not, let's say, to a level what they would prefer. So I think it will take a longer time for China, that people will say, ‘we are going to look for meat alternatives’. For dairy, that's even more the case, because if one product is seen as positive, and that's no discussion whatsoever, it's milk in China” (Respondent 5, 2019).

“I think the shift is going to be much slower in China than in the rest of the world. Just because they're there. They're just getting introduced to milk” (Respondent 6 2019).

In summary, the respondents highlighted the difference in dominant perceptions of the two industries, as well emphasising the effect it might have in consumption patterns. However, some respondents did, as mentioned, consider the Chinese market to somewhat behind in emphasising the environmental effect of both meat and dairy production, with extra emphasis on the positive connotation of dairy products.

4.2.3 Cellular agriculture

4.2.3.1 Chinese consumers' attitude towards cell-based meat

Besides discussing their thoughts on how demand for traditional agriculture will proceed in the future, the respondents were also asked to discuss their perceptions of Chinese consumers' general attitude towards cellular agriculture. For example, Respondent 7 highlighted a study that she had come across through her market analysing process for Avant Meats, which indicated that many Chinese and Indian people are positive to try cell-based meat proteins. This study is the one conducted by Bryant et al. (2019) that was presented in relation to the secondary data above. This perspective was also supported by the director of cellular agriculture at the San Francisco based company JUST, Respondent 4, as well as by Respondent 1. They both suggested the Asian market to be a potentially good place to start with cellular agriculture. According to Respondent 1, one of the main reasons is that the Chinese way of consuming meat products is more aligned with the cellular agriculture development.

“China actually is a better market for cellular agriculture than the US. Because the US, when you think about, let's say plant protein based meats. You think about faking a steak, or faking a hamburger, or faking like a very large piece of meat. Were as, actually in China, you could get away with faking minced meat” (Respondent 1 2019).

Respondent 1 referred to the challenge of creating the natural texture of conventional steaks, which she considered to be a key issue to overcome if cellular agriculture should have the potential to convince specifically American consumers. When talking about Chinese consumers, on the other hand, she claimed that they:

“...don't expect a chunk of muscle meat, anyway. So the texture is completely different, you know. Expectation of texture and taste” (Respondent 1 2019).

Some respondents also highlighted that cell-based meat could imply completely new types of products that could be a driver for increased consumption in the future. For example, and in line with the previous assumptions concerning Chinese consumers' curiosity towards novel food, Respondent 3 claimed that products that are hard to access as of now could be artificially manufactured. Furthermore, he suggested that the technology could enable exciting innovations such as combining tissues from different animals.

4.2.3.2 Chinese consumers' attitude towards cell-based dairy

The fact that cell-based meat is developed from a tissue from the animal may be a relevant factor for consumers' attitude, and in light of this, Respondent 7 assumed that there might be important distinctions between how cell-based meat and dairy will be perceived on the market. She referred to the differences between tissue engineering and fermentation engineering and said that the process of growing dairy has many similarities with products developed for external use, such as collagen for skin care. She suggested this to be a barrier for consumers:

“(There) might be some psychological not so rational, you know, kind of hurdles at the beginning that people will think that, ‘oh this is something I can eat?’” (Respondent 7 2019).

She further justified the assumption of irrationality by saying that also the beer industry uses a similar yeast fermentation process and claimed that it is more about the marketing and the market education to decide whether the products will be perceived as natural by consumers. A similar argument to this, that highlights the unnaturalness of fermentation engineering, was also brought up by Respondent 8. In relation to his argument that plant-based substitutes cannot replace conventional dairy in terms of its' superior nutrition base, he made a suggestion that cell-based dairy technically has the potential to mimic conventional products and that it for

example could make up a good alternative for infant products. However, he also said that he does not believe in the market potential of such an artificial product.

“This is not exactly what consumers, or let's say what mothers wants for the babies, they want to go as natural as possible” (Respondent 8 2019).

The same concern was expressed by Respondent 2, who emphasised Chinese consumer's preference of getting their nutrition from natural sources. Claiming that cow milk could be substituted by cell-based milk is a big assumption to make according to him, and that data on the reaction of different demographic segments would be needed for further conclusions regarding that development. Moreover, Respondent 2 referred to the difference between Chinese consumers relative to consumers from other parts of the world, saying that they do not base their decisions on ethical matters to the same extent. Instead, he meant that health is an important factor in the Chinese consumer's decision-making, and that animal protein and dairy in the current format are considered to be important aspects of healthy diet today.

4.2.3.3 Cellular agriculture as a tool to improve food safety

The naturality aspect of cellular agriculture represents a relevant inconsistency, where some argue that artificial products will be an inferior alternative, while others claim that it has the potential to reach the quality of conventional products. For example, Respondent 3 made a clear statement that its' few aspects of the conventional agricultural industry that are very natural and Respondent 4 pointed out that cell-based products could actually provide a better alternative for consumers than the conventional counterparts.

“So, if you think about the problems of conventional meat production. Most of the.. If you think about chicken and it's completely contaminated with fecal matter with salmonella with a lot of bacteria, in boxes, most of them happen during the slaughtering of the animals. So that's the cross contamination. And when we do cultured meat, we skip completely that step” (Respondent 4 2019).

The ability to fully control the production process together with Chinese consumers' high concern about food safety is one out of several factors that makes China a target market for Respondent 4's company JUST to introduce their products to the market. The issue of food safety was even more emphasised by the respondents when discussing the dairy consumption

and many referred to the melamine scandal that took place in China in the late year of 2000. According to some, food safety will be a crucial point to handle for everyone who provide dairy products and as Respondent 7 highlighted, this could actually be an adequate selling point for cell-based dairy specifically (Respondent 7 2019).

4.2.3.4 Institutional influences

On the topic of how cellular agriculture might develop further in a Chinese context, several respondents emphasised the importance of the actions made by the Chinese government. As mentioned earlier, regulations towards the conventional industry was believed to have a significant impact on the realisation of new innovations in the field, but also governmental actions connected to cellular agriculture was raised as an important factor. For instance, Respondent 7 meant that flexible regulations is a critical point for all companies involved in cellular agriculture solutions. Moreover, she meant that the Chinese government is with certainty conducting research within the area, even though it is not visible to the public yet. Elaborating on the same note, Respondent 4 meant that the Asian regulatory market has come a long way in comparison to the rest of the world, partly referring to the fact that the Chinese government has invested millions of dollars in Israeli companies in the cell-based meat movement.

“....it came directly from the government, so it's definitely a movement that is a political sort of direction already and they're understanding that this is a necessity. Which is a huge difference to everywhere else in the world. You don't see that kind of a change happening already in the US or in Europe” (Respondent 4 2019).

Furthermore, some respondents commented on the importance of marketing and the packaging of the products towards Chinese consumers, if it should be possible to introduce it successfully. Respondent 1 stated that she believes that this can be totally accepted by consumers as long as it has the right slogans and packaging. Based on the Chinese consumers' interest of Western products, she said:

“You just call it ‘safer food’ or you call it like ‘Western..’ you know, ‘technology’ or whatever” (Respondent 1 2019).

On a similar note, Respondent 3 agreed on that the first cell-based meat product would probably be introduced as a sausage or something similar, enabling the difference in content compared to conventional meat products to not be visible to the naked eye. Such launching strategies are in line with what Respondent 7 highlighted when giving the example of selling cell-based dairy in coffees at cafés, saying that people would be drinking it without understanding what they are actually consuming. According to her, this illustrates how the decision process can be transferred from the individual itself to the hands of the business:

“Well, assuming that the quality and the performance of the milk as an ingredient in other food products is the same, then people will be... then the decision maker is not individual, but actually the businesses” (Respondent 7 2019).

4.2.3.5 Incumbents’ reactions

When embarking upon the subject of a potential disruption of the industries in focus, many respondents had opinions and viewpoints on how the conventional actors would position themselves in relation to such a development. One opinion expressed by several respondents was that the incumbent’s power is not to be underestimated, and that their political and commercial power can be used to work against potential disruptors. The rationale behind a resistance would be to view companies within cellular agriculture as a threat to their own operations, and to avoid their development from overtaking the incumbent’s market share (Respondent 2, Respondent 6 2019). Respondent 2 also pointed to the highly vertically integrated value chain of, specifically, Chinese dairy companies.

“I think it is even more extreme in China, because the dairy companies actually own their own farm, so they are trying to be vertically integrated, so you know, when you own say 200 000 milking cows, you are not going to be very interested in switching” (Respondent 2 2019).

A common topic was also the previously mentioned investment made by Tyson Foods into Memphis Meats, and what types on conclusion that could be drawn from that. Respondent 2 presented a relatively cynical approach towards the investment and suggested that Tyson Food have invested in the sole purpose of keeping an eye on the development of a potential future competitor. Tapping into this reasoning, Respondent 7 raised a related aspect, claiming that the investment could be a strategic move in the purpose of positioning the brand towards a more sustainability aware and responsible taking actor. In general, she said that she believe in similar

investments also from others in the immediate future, but that a distance would be held by the more established brands until the development of cellular agriculture had proven successful and safe. However, no matter the reason, voices supporting future investments to be a more frequently occurred scenario in the future were raised (Respondent 7, Respondent 6 2019).

Due to that some respondents actually works at incumbents and established actors within the Chinese dairy industry, they specifically were asked of their thoughts on how their company would react to an accelerated development within this field. From the incumbent's perspective, they claimed, the development of cellular agriculture within the dairy industry had not come far enough for it to be considered an investment target or subject of resistance (Respondent 5, Respondent 8 2019). However, if proven more impactful in the future, Yili Innovation Center, the innovation division of one of China's largest dairy companies and the firm that Respondent 5 represents, said that it would be something to look at. In terms of adaptation to an industry focused towards cell-based dairy products, Respondent 5 claimed that Yili is not bound to the model ruling the market at the present (Respondent 5 2019).

4.3 Chapter summary

When weighing the insights extracted from primary data together, it is evident that the industrial actors perceive and interpret the need for a cell-based substitutional innovation in the meat industry as higher than the need for a similar innovation in the dairy industry. Furthermore, the secondary data clearly shows that the movement of cell-based meat is much more populated in terms of number of companies and funded in terms of investments, which suggests that industrial actors acts according to their perceptions and interpretations of the market need. This insight, together with many others, will play an important role in the analysis and discussion to follow.

5 Analysis & discussion

To find an answer to the research question of this study, the following section will be dedicated to analysis and pattern matching of empirical findings and the findings generated from the literature review. However, the insights that lead up to the preliminary framework have been complemented and enriched by the insights from the empirical findings, why a revision of the framework was considered important to present in the initial part of the analysis, as it is needed for the reader to have a sufficient framework to depend on. Based on the logic presented in the chapter summary of empirical findings, the industry's collective perception of the cellular agriculture development highly impacts their actions, which in turn can have a major impact on consumers' behavioural intention. These aspects are therefore important to consider when predicting the development of consumer behavioural intention accordingly. Thus, this study's final framework is presented below and will serve as the foundation for the analysis and discussion that follows.

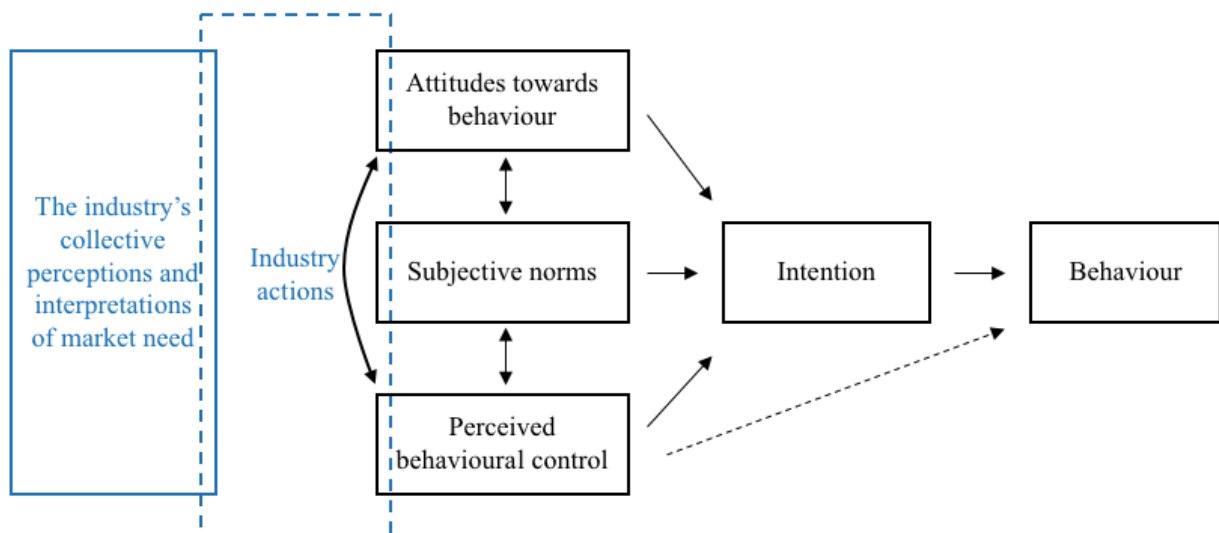


Figure 3. Final framework

5.1 Industry's collective perceptions and interpretations of the need for cell-based meat

5.1.1 The conventional meat industry in China today

The interview data indicates a relatively aligned view regarding the reason for increased meat consumption in China, which is in accordance with Bai et al.'s (2018) previous suggestion that the economic growth is one of the main drivers. The latter year's economic development has created groups of newly affluent citizens in China's largest cities, which in turn have created new consumption habits. These consumers, who previously based their consumption choices on what was available and affordable, have recently been given the opportunity to choose more selectively. In conjunction with this, some of these newly affluent consumers have shown a tendency of wanting to show their wealth by consuming more luxurious goods, in this case represented by a new type of meat consumption. Accordingly, these consumers have adopted food consumption habits in line with their Western counterparts, making meat a more commonly occurring element of their diets. Applying TPB to this behaviour, the concept of subjective norms is evident. The consumption of wealthier parts of the world and the general norm of what is considered luxurious has influenced the behaviour of the Chinese wealthy consumers. Moreover, the concept of perceived behavioural control can also be applied to the Chinese consumers' increased consumption of conventional meat. Before China entered its' phase of rapid economic growth, meat products was not as accessible as it is today. This depends partly on that consumers' could not afford meat products to the same extent and also due to the general availability of meat products. Those two components have probably influenced the last component of the original TPB model, namely the attitude towards meat consumption, which almost all respondents discussed as being increasingly positive in the wealthier parts of China. Therefore, when analysing the consumption of conventional meat products in China, the original TPB framework is sufficient to explain the consumers' behavioural intention, due to its' applicability to already existing consumer behaviour.

However, despite this positive approach towards conventional meat consumption, some answers indicate that this trend could reach a turn in the near future. The respondents specifically related this assumption to environmental concerns and suggested that other values could start to evolve when the economic wealth of these consumers reaches a certain point. Thus, when consumers with improved economic conditions have consumed the "new" animal

protein for a period of time, they could instead experience an abundance and realise the downsides related to the very same habit. According to this assumption, sustainability matters could then be a new determinant for consumer decisions. Relating this to Macovei's (2015) findings, who suggested that consumers tend to act more pro-environmentally when they realise the sustainability implications of their behaviour, this would imply that consumers reconsider the environmental impact to be of greater value than the sense of luxury they can get from meat consumption today. This development has not yet occurred in China, but was considered a potential development in the future. When combining this perspective with the secondary data, showing that the movement around cell-based meat is seeing a rapid development, it is possible to assume that this is also a common belief within the industry, where many actors seem to believe in change of demand related to meat in the future. Thus, it is likely to assume that when the industry predicts a future increase in consumer demand for more sustainable meat alternatives, their actions are adjusted accordingly.

5.1.2 The industry's perceptions of the development within the meat industry

The respondents agreed upon that consumers perceive the environmental impact of the meat industry to be higher than other agricultural industries. This may be explained by the intense debate around meat consumption, why many respondents also agreed that the meat industry have to find new ways do decrease its' environmental footprint. This point was mainly made in a general context, and therefore not specific to the consumers of the Chinese market. The reason to why they spoke about this on a more global level and consequently not addressed those issues to China specifically, can be explained by the challenge of generalising the aspect of China's novel concerns about the environment, which was suggested by Wang et al. (2018). On the same contextual level, the meat industry was also claimed to be perceived as a more controversial industry than the dairy industry. The suggested reason for this was mainly the association with the slaughtering of animals that takes place in the production of meat. This data indicates that industrial actors recognises the need for a more sustainable alternative to meat, which could explain why the review of the market landscape for cellular agriculture showed that cell-based meat is a more populated and funded market segment than the segment of cell-based dairy.

In the context of Chinese consumers' general perception of the meat industry, respondents meant that the previously claimed perception of environmental impact was less emphasised in China. This was explained by the fact that Chinese consumers' have recently been introduced to meat consumption. This finding is important, as it implies that the respondents of this study seems to perceive the meat industry in China to have a longer survival than its' counterparts in many other parts of the world. For example, our secondary data shows that the development of cell-based meat has come a lot further in geographies such as the US and Europe, while China have only one representative company focusing on cell-based meat (Appendix A). When analysing the meat industry in terms of the stages towards an industrial shift (Utterback and Abernathy 1975), one can therefore suggest that the Chinese meat industry can be found in an earlier maturity stage than other markets in which the cell-based meat movement has started to grow. Therefore, Chinese consumers have not been exposed to an equal amount of market activity as other consumers (Appendix A), whereas their preferences might be perceived as lower when evaluated by industry actors, which in turn affects their belief of an industrial shift in the Chinese market. Interestingly, this is somewhat contradictory to what previous research on Chinese consumers' acceptance towards cell-based meat shows, where 59,3 % of Chinese survey participants found it very or extremely likely for them to purchase cell-based meat (Bryant et al. 2019).

Moreover, the respondents with a more cell-based supportive perspective also emphasised that the government might take actions to address sustainability issues of the conventional industry, which in turn could favor the cell-based meat movement. Based on that governmental support has shown to be very impactful to a business' survival (Aghion et. al 2015; Howell et. al 2016; Qu & Harris 2019), their optimism towards a coming industrial shift can be seen as fairly realistic. Not least because of the fact that the Chinese government recently released new guidelines regarding meat consumption, with an ambition to decrease the total consumption by 50 % until 2030 (Milman & Leavenworth 2016). This was emphasised as a potential driver to an industrial shift in the conventional meat industry. Moreover, when seeing to the increased demand in China specifically, they also agreed on that such a shift will not be driven by the consumers, but rather from the overall industry including the government, which emphasises the need for an extension taking industry's, including the policy makers', role into consideration, as presented in the final framework.

5.1.3 The industry's perceptions of consumers' behavioural intentions towards cell-based meat

Going further to the industry's perceptions about consumers' behavioural intentions towards cellular agriculture, the respondents emphasised several valuable perspectives. It is worth to notice, however, that very little of this discussion were focused on the technological aspect of cell-based meat and whether consumers were to accept or reject the technology itself. Rather, they discussed the product's utility compared to consumers' eating habits and whether the cell-based meat offered a comparable way of consuming meat. Thus, even if many attempts have been made in order to explain consumer behaviour in relation to technological innovations (Chen & Huang 2016; Msaed, Al-Kwif & Ahmed 2017; Kulwaif et. al 2007), it confirms the assumption made in the introductory chapter of this study, namely that these extended models of the TPB cannot be applied to the case of cellular agriculture. One possible explanation to this could be that the technique behind cellular agriculture also implies a perceived difference of naturality, which is an aspect not normally associated with technological innovations. This aspect is further supported by the studies on consumer attitudes towards cell-based meat brought up in the section of secondary data (Bryant & Barnett 2018) as well as by those respondents who claimed that cellular agriculture overall might be perceived as artificial. Seeing this finding through the lens of original TPB, it would imply that consumer behavioural intention towards cell-based meat should be considered low. However, as elaborated on below, the industrial actors can impact the degree to which this concern is registered by consumers.

Nonetheless, the interview data includes insights regarding the applicability of cell-based meat in China. The likelihood of that cell-based meat will succeed in the Chinese market was generally supported by the respondents, which applied for other Asian markets as well, although it was not necessarily seen as a substitution that will outcompete conventional meat in the near future. As seen in the secondary data, this has already been suggested by Bryant et. al (2019), but in addition to that, the respondents based their assumption on two main reasons. Firstly, the Chinese regulatory landscape and the governmental approach towards the novel technique of cellular agriculture was considered advantageous. Thus, similar to the findings of Zhang et. al (2018), the respondents emphasised that a supportive legal environment is key for an industry to establish and proceed. In the context of China, the trade deal with Israel was mentioned specifically, which pertains to simplify trade of cell-based meat products between the countries. In addition, the regulatory landscape of China was considered advantageous for companies in

cellular agriculture in another sense as well. Some of the respondents mentioned that the first cell-based meat products will not necessarily have to be explicitly branded as cell-based meat, and that naming and packaging could be adjusted to enable a less emphasised difference from currently dominating products. This was suggested to be a potentially successful strategy for cell-based meat to establish. This is an important point to make, as it shows that China's regulatory landscape, the industry's marketing activities and branding strategies are tied together to consumers' behavioural intentions. The Chinese regulatory landscape allows companies to adjust the product information and packaging of cell-based products in an ambition to reduce consumers' associations to artificiality and mimic conventional products to a higher degree than other regulatory landscapes. By doing so, they can thus overcome the biases related to edibility and naturality, which was spoken of above, as well as suggested by Gallen, Pantin-Sohier & Peyrat-Guillard (2019) in their study of insect protein. Hence, in such a scenario, the consumer behavioural intention has little importance and the main determinators are rather the governmental support, as well as the businesses' ethical reasoning about how to approach consumers' beliefs, which strongly emphasises the industry's role in shaping consumer attitudes towards early phase innovations and therefore supports the extension of the TPB model, as suggested in the final framework.

The second reason to why the Chinese market would be a suitable market to start with, is that cell-based meat in its' early phase will be better in line with the Chinese way of consuming meat products, compared to consumption habits in other parts of the world. The Chinese cuisine often uses minced or sliced meat specifically, which implies that texture and taste is not as important to Chinese consumer in comparison with for instance American consumers . Thus, this eliminates one of the largest challenges that cell-based meat stands before, which is to imitate the texture and taste of conventionally produced meat. When reviewing this through a TPB lens, the finding relies on the fact that consumers' acceptance is more likely to evolve if the product is considered to be familiar, which highly relates to the component of perceived behavioural control (Ajzen 1991). In that sense, this highlights that a key similarity exists between our case and the cases of carpooling (Zhang et al. 2018; Bachmann et al. 2018), namely that the importance of perceived behavioral control is emphasised. However, in contrast to Zhang et al.'s (2018) derivation, being centered about policy support, our findings indicate that also the industrial actions in general strongly impact the perceived familiarity of early phase innovations, partly by offering a product that is similar to those already consumed. Another

aspect that can raise the familiarity and followingly, the importance of perceived behavioural control will be further emphasised below.

5.1.4 Industrial actions in relation to the cell-based meat movement

In line with the general assumption of industrial influences on consumer behavioural intention towards early phase innovations that underlies the final framework of this study, it is clear that the cell-based meat development generates and will generate reactions from the conventional industry and its' stakeholders. In addition to the initiatives taken by the government, the respondents also addressed how traditional meat companies have shown interest towards cell-based technology. This was specifically exemplified by the investments made by Tyson Foods in the cellular agriculture firm Memphis Meat. Even though this is an example of an American meat company's actions, it was considered an important industry event, which potentially could happen in other markets, such as the Chinese. In relation to the event, the underlying objectives for this investment was problematised. For example, some believed the intentions were genuine and that Tyson Foods wants to support and join the development. Others meant that Tyson Foods probably invested out of strategic reasons, branding purposes and to create means for investigation of potential competition. Similar to this, the findings of Deng et. al (2017) that suggest investments in disruptive innovations to correlate with managers' fear of losing profit, provides a third rationale to why Tyson Food made its' investment. No matter the reason, the investment resulted in a large amount of branding for both firms, as well as the technology itself, which contributed to an increased attention towards the cell-based meat movement in general. Once again, such attention may have implications on the factors that stimulates and determine consumers' behavioural intention in a positive way. The assumption that consumers' acceptance towards cell-based meat has been shown to increase with the degree of familiarity (Bekker, Fischer, Tobi & van Trijp, 2017; Wilks & Phillips, 2017) can thus be seen to apply to this context too. Raising this finding to the general case of early phase innovations, the impact of industry actions are proved important, as they highly affect consumers' behavioural control. If industrial actors intensifies their actions towards an early phase innovations, the consumers' attention will be captured and their familiarity towards the innovation will be increased. If industrial actions are few, consumers will be unaware and unfamiliar towards the innovation. This emphasises the connection between industry actions and consumers' perceived behavioural control.

5.2 Industry's collective perceptions and interpretations of market need for cell-based dairy

5.2.1 The conventional dairy industry in China today

The underlying factor behind the increased dairy consumption was by all respondents claimed to be the government's support of dairy products as a nutritional component of importance. Thus, one can suggest that the underlying drivers to the increased consumption of dairy derives from a significantly different source than meat, where the government and industry itself can be held accountable for having created the consumer demand. This relation can be explained by the intervention perspective of the TPB (Ajzen 2012), which suggests that consumers' behavioural intentions can be stimulated in a desirable way. For instance, the respondents emphasised that the government's guidelines towards increased dairy consumption derived from their ambition to make their citizens as strong and healthy as citizens of Western cultures. This is something that the conventional industry seems to have utilised and some respondents emphasised that dairy products have been promoted as a positive and crucial segment of Chinese consumers' diets. Seen from a theoretical perspective, attempts to influence behaviour is more likely to succeed if the desirable behaviour offers something motivating to the consumer and if it is perceived as easy to accomplish by the individual (Ajzen 2012). As both these factors can be found in the case of Chinese consumers' dairy consumption, referring to the incentive of better nutrition and the subsidies that turned dairy into an affordable alternative, it is possible to address the dynamics between industrial impact and Chinese consumer behaviour of conventional dairy products.

5.2.2 The industry's perception of the development within the dairy industry

The assumption that dairy products now flourish on the Chinese market made the respondents believe that no real change was to be expected anytime soon. As presented above, respondents' presented a similar prediction when discussing the coming development of Chinese consumers' meat consumption. However, in the case of meat, the respondents complemented this disbelief with arguments supporting the scenario that the Chinese market could also see a parallel demand for cell-based meat in the future, which was not considered evident in the case of cell-based dairy. Even though this prediction of cell-based dairy was supported by a majority of the

respondents, their argumentations differed. Firstly, the respondents from the conventional dairy sector meant that the demand for conventional dairy is mainly connected to its' nutritional value, and that non-dairy alternatives will not be sufficient substitutes. However, this statement can very much be questioned as the cell-based dairy aims to mimic the conventional dairy and would therefore live up to the same level nutritionally. Consequently, this indicates that incumbents in the Chinese dairy industry ignores the nutritional possibility of cell-based dairy. The incumbents unwillingness to see this can be explained by their fear of cellular agriculture becoming a success, which could have negative implications for their businesses. This could be found extra evident in China, as many of the dairy producing incumbents also owns the farms, the value chain actor that would probably face the largest implication if a disruption took place. However, as they are vertically integrated, it can be assumed that they also have the bargaining power to prevent the cell-based dairy movement to succeed. This can be related to the findings by Deng et al. (2017), who suggested that established firms with certain economic interests can lobby the government in a certain direction and thereby gain support that favour them accordingly. The more important aspect is, however, that the government's incentives seem to be aligned to those pushed for by the incumbents, as they continuously have shown interest in upholding the demand for conventional dairy due to its utility as a cheap source to protein. Qu & Harris (2019) have suggested that firms with political links are more likely to survive throughout industrial movements, and due this, the likeliness for the conventional dairy to be disrupted could be assumed to be very low. Thus, by adding Adner & Snows (2010) perspective, that incumbents can chose to stay with old technology if they perceive a support from policy makers, it is understandable that the industry choose to not perceive the cell-based dairy as something that is a real threat to their current business.

Moreover, another argument highlighted by several respondents, was that the great variety and development of plant-based alternatives implies that there is no need for cell-based dairy. However, this argument contradicts to the issue of nutrition above, as plant-based dairy alternatives have been claimed as not being a real substitute to dairy from a nutritional point of view. No matter the reason, the data indicated that the industry did not believe cell-based dairy is probable to gain market shares in the Chinese market in the near future. The potential resistance from incumbents, as well as the government's incentives to uphold the industry is another support for the importance of taking industry actions into consideration when investigating consumers' behavioural intention towards early phase innovations such as cell-based dairy. This resistance could also be an explanation to consumers' non-existing demand

för cell-based dairy, as they have not been exposed to it through industry actions yet. This observation is consistent with the findings in the section of secondary data concerning current market development for cellular agriculture, meaning the industrial beliefs about cell-base dairy is consistent with its' development.

On another note, respondents meant that the incentives for decreasing dairy consumption would be different from the incentives to decrease intake of meat products, which implies that the underlying factors that would motivate a disruptive change of the industry also would be different. One respondent claimed that a decreased dairy consumption would be motivated by health or superficial reasons, which implies a different drivers for substitution than the ones mentioned for the meat industry, that in turn have been expressed as being a harmful industry in terms of environmental impact and animal welfare. Related to this, the respondents meant that the dairy industry is not accredited the environmental impact that it deserves, meaning that the perceived environmental impact of the industry is lower than it actually is. As one of the main drivers behind cellular agriculture is its' ability to address environmental issues, this too indicates that the industry does not perceive a need for cell-based dairy. According to the respondents, the reason for why consumers tend to underestimate the dairy industry's environmental impact is hard to deduce. However, it can be assumed that the great amount of positive communication that has encapsulated the dairy industry in China may be an influential factor to this development. Thus, the industry's collective interpretations tells us that it seems the conscious intervention initiatives that have been taken by the industry, primarily the government, once again have influenced the general attitudes held by consumers.

Moreover, and fairly interestingly, several respondents expressed that they too were victims to the misperception they assigned to consumers regarding the environmental impact of dairy. This is an important aspect to consider, as it implies that the potential misperceptions of the dairy industry does not derive from the industry, and does not come from an ambition to delude or mislead the consumers. Rather, it points towards an intertwined relationship between the actions taken by the industry and the response expressed by consumers. As consumer responses are interpreted by the industry, they will possibly impact the industry accordingly, resulting in that the initial perception becomes even more established. As consumer awareness about the consequences of their behaviour is a crucial determinant for pro-environmental behaviour (Macovei 2015), it is obvious why no demand for cell-based dairy is evident, since not even the industry seems to recognise the environmental impact of the conventional dairy industry.

5.2.3 The industry's perceptions of consumers' behavioural intentions towards cell-based dairy

The preconceptions discussed above helps to understand why the respondents tended to dedicate less time to cell-based dairy specifically. Instead, when leading them into the discussion of Chinese consumers' acceptance towards cellular agriculture, more attention was paid to the prospects of cell-based meat. Further, they assigned cell-based dairy lower chances to enter the market anytime soon, often referring to the idea that cell-based products in general, and dairy specifically, run the risk of being perceived as unnatural. They assigned this risk to be extra evident in the case of cell-based dairy because of the fact that its' production process, in contrast to cell-based meat, completely lacks a direct connection to the living animal.

This draws on another interesting interpretation of the dairy industry, as no studies have, according to the best of our knowledge, yet been focused on consumers' attitude towards cell-based dairy specifically. This implies that the perception held by the industry itself relies on a relatively vague ground. Especially when comparing to the counterpart of cell-based meat, that has formally been criticised by consumers as being perceived as unnatural (Marcu, Gaspar, Rutsaert, Seibt, Fletcher, Verbeke & Barnett 2015; Tucker 2014; Verbeke, Marcu et. al 2017; Wilks & Phillips 2017). Nonetheless, one of the explanations to why unnaturality concerns towards cell-based dairy would be worse than for meat was that much of the perceived value of dairy is associated with its' nutritional value, which, according to some respondents, is hard to combine with a substitute that yields a sense of unnaturality. The fact that cell-based dairy actually derives from a production process which can be even safer and cleaner than conventional production was not brought up as a meaningful aspect when addressing its' potential to reach the market. This is noteworthy, considering the Chinese consumers' concerns about food safety and the fact that their trust towards the conventional dairy industry was damaged after the melamine scandal in 2000. Even if cell-based dairy in many ways have shown potential to address this safety issue, along with other issues discussed above, the industry does not seem to perceive it as a potential substitute to the current industry standard.

5.3 Chapter summary

The industry's collective perceptions and interpretations of the market need for a substitutional innovation seems to be higher in the case of meat than in the case of dairy. The main indications for this is the likely scenario of emerging affluence leading to higher awareness of sustainability issues, but also the governmental influences regarding regulations towards conventional meat consumption as well as actions pertaining to increase international trade of meat substitutes. On the other hand, the aspects supporting the unlikelihood of a cell-based substitution of dairy products is mainly the positive connotations connected to conventional dairy products generated by governmental and industrial actors, but also the perceived lower environmental and animal harm consequences in comparison to consequences of the meat industry, which applies to both industrial actor's beliefs about consumer perception, but also their own perceptions. Another finding supporting this conclusion is the difference in interview space devoted to the two industry segments. In general, respondents tended to speak more about the meat industry and cell-based meat than they spoke about the case of cell-based dairy.

Additionally, upcoming cell-based meat products are considered to share many characteristics with the dominating meat products in the Chinese market, which supported the probability of cell-based meat being applicable and familiar to the behaviour of Chinese consumers. In the case of cell-based dairy, the industry's perception seems to be that it is not as applicable to Chinese consumer habits, with reference to the importance of the nutritional content in dairy as well as consumers' probable perception of unnaturalness connected to cell-based dairy specifically. As for the nutritional aspect, even though there are strong indications that cell-based dairy might provide equal nutritional content as conventional dairy, the industry seems to believe that consumers will not recognise this. In conclusion, the industry's collective perceptions and interpretations assigns higher probability to the development of cell-based meat than the development of cell-based dairy.

Moreover, as seen in the review of the current market landscape for cell-based products, the number of companies and the invested amounts are higher in the segment of cell-based meat and tissue engineering than in cell-based dairy and fermentation engineering, even though many have considered fermentation engineering to be an easier production to establish in a larger scale. This finding supports the conclusion above, that the industry seem to believe more in the

emergence of cell-based meat, and that they perceive the consumers need for it to be higher than for cell-based dairy. Relating this to the final framework of this study, it is of high importance to acknowledge the industry's role in shaping and affecting consumers' attitude towards a certain behaviour, the subjective norms between them and their perceived behavioural control. Additionally, we would like to raise the significance of the perceived behavioral control when applying TPB to the case of cell-based products specifically, and early phase innovations not known to consumers in general. Earlier studies on consumer attitudes towards cell-based meat have acknowledged the impact of familiarity and provided information, and consumers attitudes varies in correlation with these variables. The primary data of this study supports this further, not least indicated by the example of perceived environmental impact of the industry segment. Even though respondents' acknowledged the actual environmental consequences of the meat and dairy industry are equal, the consumers do not recognise this due to a general emphasis on environmental issues of the meat industry, of which more information and attention is provided. Moreover, the importance of familiarity and accessible information can even more distinctly supported by the fact that the actual industry development, being that cell-based meat has come further than cell-based dairy, and the industry's collective perceptions and interpretations, being that cell-based meat has a better chance to breakthrough than cell-based dairy, are aligned. The reasons for why this should be considered proof of why industry actions highly affects the consumers' behavioural intention towards cell-based product are two. Firstly, from an environmental perspective, the need for a dairy substitution is, according to our study, to be considered close to or equally large as for the meat industry. Secondly, the production technique behind cell-based dairy is considered easier to realise and scale up than the one behind cell-based meat, while also addressing many of the issues related to the conventional dairy industry. With this in mind, it would be reasonable to believe cell-based dairy would have gotten more attention by now, but the industry have mainly directed their attention towards the problems of the conventional meat industry and, followingly, the potential of cell-based meat. This have generated a higher perceived need of consumers, and subsequently, behavioural intention towards cell-based meat.

6 Conclusion

6.1 Research purpose

The purpose of this study was to gain and provide understanding and insights regarding the industry's impact on consumer behavioural intentions towards early phase innovations, by using the development of cellular agriculture, and its' applicability in the Chinese meat and dairy industry as an instrumental case. Additionally, the aim and objective of this study was to extend the theory of planned behaviour with the perspective of industry impact, to enable further usage of the framework in cases of early phase innovations. This was done by interviewing industrial actors that represented different parts of the industry to acquire their perspective on the development, which when compared with market development data could be used to prove the industry's role in consumers' creation of behavioural intentions towards early phase innovations. Below, this conclusion will be elaborated further, from the perspective of theoretical and practical implications.

6.2 Theoretical implications

To address the research question of this study, the industry affects the consumers' behavioural intention towards early phase innovations in two ways. Firstly, the actions of industrial actors serves as information upon which consumers' familiarity towards the early phase innovations is built. The original model of TPB is insufficient to explain what constructs consumers' behavioural intentions towards innovations they yet have not had the possibility to experience, why an extension of the framework through the component industry actions is needed when evaluating consumer behavioural intentions towards early phase innovations. Secondly, the industry actions are in turn a product of the industry's collective perceptions and interpretations of the market need for the early phase innovation. This conclusion is important, as it emphasises the relationship between consumers and industry in the development of coming innovations. As industry actors have shown to base their actions on their perception and interpretation of

consumers, and consumers have shown to base their behavioural intention towards the new innovation on industry actions, an intertwined and complex relationship reveals itself in contexts like this. This implies that TPB not only have to be extended with the suggested components in the final framework of this study, but possibly additional components building up the component of industry's collective perception and interpretations of market need. This theoretical implication will be elaborated on further down in the section of future research.

Another theoretical implication of this study is the extended significance of perceived behavioural control in cases of early phase innovations. This conclusion is highly connected to the highlighted importance of familiarity in the case of cellular agriculture in specific, but early phase innovations in general. If familiarity is found high, consumer behavioural intention is more evident and traceable, and if it is found low, a result of the original TPB model is hard to deduce overall. This further emphasises the theoretical implications stated earlier generated by the suggested extensions of the TPB framework, as these in turn help to explain the degree of perceived behavioural control towards the early phase innovation at hand.

Taken together, the theoretical implications generated by this study have many similarities with ones generated by Zhang et al. (2018). However, as a consequence of the contextual differences of the studies, one significant difference must be considered, which supports the extensions of TPB presented in the final framework of this study. Although policymakers' actions has proved important in the case of early phase innovations as well, it is of utmost importance to take the industry's actions as a whole into consideration, since taken together they are the ones governing the input upon which consumers' base their behavioural intention on.

6.3 Practical implications

The conclusions drawn from this study can prove to be useful for practitioners. The emphasised impact of industry actions, when investigating consumer behavioural intentions towards early phase innovations, can be utilised by several industry actors in their daily operations. For instance, investors can benefit from analysing industry actions and the attention generated from them to understand consumers' potential behavioural intention, and consequently, the development of consumer acceptance towards evolving innovations in early phases. On the same note, incumbents and innovators could benefit from similar analyses when determining

their actions and reactions towards developing innovation and product segments. In other words, analysing industry actions and the effect they have on consumer attitudes might serve as a tool to forecast the development of early phase innovations, which in turn can function as a basis for decision making for both short and long term actions. With that said, it is important to notice that such analyses will not lead to definite prognoses, but rather indications. However, as cases of early phase innovations involve a large proportion of uncertainty, we argue this is a practical implications of significance for industry actors all over the value chain.

6.4 Limitations & future research

Although this study has been considered an instrumental case with generalisable findings, theoretical and practical implications, there are limitations connected to it. One of the limitations has to do with the intended scope of the research object and the actual scope of the data collection. Due to the limited time frame of the study, in combination with geographical distance between the research object and ourselves, the number of respondents have been limited and one can question their ability to represent the entire industry perspective. Also, as governmental institutions is considered to be a part of the industry, it would have been purposeful to include respondents from the Chinese government in the data collection. However, due to a number of reasons, such as geographical distance, lingual barriers and characteristics of Chinese governmental institutions, we were not successful in our ambition to find respondents from this industry segment. If the respondent sampling would have included this perspectives, as well as a broader industrial representation in general, our contribution would have been considered stronger and more omniscient. On the same note, despite consumer attitude has been a central theme in our research, no Chinese consumers were interviewed. This was however in line with the purpose of the study, and the fact that it pertained to investigate the impact the industry had on consumer attitude towards early phase innovations. Therefore, actors from different parts of the conventional and emerging industry was considered more accurate and purpose fulfilling respondents, than consumers.

Furthermore, this study opens up for future research in the field of predicting consumer behavioural intention towards early phase innovations. Addressing the contribution of our research, we would encourage other scholars to include both industry representatives and consumers in the data collection when evaluating similar cases in the future. As consumers'

behavioural intention towards a non-existing behaviour is a highly complex subject, we believe that additional perspectives are needed to fully understand the creation of consumer attitudes in early phases. As the industrial perspective was in focus in this study, we did not have the ability to evaluate the consumer side of the equation. Instead, we have tried to fill this gap by taking previous studies concerning consumer attitudes towards the study object into consideration, which have been included to the analysis as a secondary data source. However, by including consumers as a primary data source, future researchers could contribute with additional understanding to the relation between consumer behaviour towards dominating products, industry actions and consumers' behavioural intention towards early phase innovations. Moreover, as stated in the sections of theoretical implications, we also believe that future research could be directed towards studying the relationship between the industry's collective perceptions and interpretations of market need and consumer behaviour towards the dominating solution, which the innovation pertains to substitute. The findings of this study indicates that there is a complex and intertwined relationship between these phenomenons, which additional components could help explain further.

References

- Adner, R. & Snow, D. (2010). Old technology responses to new technology threats: demand heterogeneity and technology retreats. *Industrial and corporate change*. 19(5). pp. 1655-1675.
- Ahgion, P., Dewatripont, M., Du, L., Harrison, A. & Legros, P. (2015). Industrial policy and competition. *NBER - National Bureau of Economic Research Working Papers*.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In Kuhl, J. & Beckmann, J. (Eds.), *Action-control: From cognition to behaviour*. pp. 11-39. Heidelberg: Springer.
- Ajzen, I. (1991). The theory of planned behaviour. *Organisational behaviour and human decision processes*. 50. pp. 179-211.
- Ajzen, I. (2012). Martin Fishbein's legacy: The reasoned action approach. *The annals of the American academy of political and social science*. 640. pp. 11-27.
- Alvesson, M. & Sköldbberg, K. (2009). *Reflexive Methodology*, London: SAGE Publications
- Anderson, P. & Tushman, M. L. (1990). Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change. *Administrative Science Quarterly*. 35(4). pp. 604-633.
- Bachmann, F., Hanimann, A., Artho, J. & Jonas, K. (2018). What drives people to carpool? Explaining carpooling intention from the perspective of carpooling passengers and drivers. *Transportation research part F: Traffic psychology and behaviour*. 59(A). pp. 260-268.
- Bai, Z., Lee, M. R., Ma, L., Ledgard, S., Oenema, O., Velthof, G. L., Ma, W., Guo, M., Zhao, Z., Wei, S., Li, S., Liu, X., Havlik, P., Luo, J., Hu, C. & Zhang, F. (2018). Global environmental costs of China's thirst for milk. *Global environmental costs of China's thirst for milk*. 24. pp. 2198-2211.
- Bekker, G. A., Tobi, H. & Fischer, R. H. (2017). Meet meat: An explorative study on meat and cultured meat as seen by Chinese, Ethiopians and Dutch. *Appetite*. 114. pp. 82-92.
- Bhat, Z. F & Fayaz, H (2011). Prospectus of cultured meat - advancing meat alternatives. *Journal of food science technology*. 48(2). pp. 125-140.
- Bryant, C. and Barnett, J. (2018). Consumer acceptance of cultured meat: A systematic review. *Meat Science*, 143, pp.8-17.
- Bryant, C., Szejda, K., Parekh, N., Desphande, V. and Tse, B. (2019). A Survey of Consumer Perceptions of Plant-Based and Clean Meat in the USA, India, and China. *Frontiers in Sustainable Food Systems*, 3.
- Bryman, A. & Bell, E. (2015). *Business Research Method*, 4 ed. Oxford: Oxford University Press.

Carrington, D. (2018). World's first lab-grown steak revealed – but the last taste needs work. *The Guardian*. Available online: <https://www.theguardian.com/environment/2018/dec/14/worlds-first-lab-grown-beef-steak-revealed-but-the-taste-needs-work>. [Accessed: 3 March 2019].

Cellular Agriculture Society. (n.d.). Timeline. Available at: <https://www.cellag.org/timeline/#top> [Accessed: 10 May 2019]

Chen, N-H. & Huang, C-T. S. (2016). Domestic technology adoption: Comparison of innovation adoption models and moderators. *Human factors and ergonomics in manufacturing & service industries*. 26(2). pp. 177-190.

Christensen, C. M. (1997). *The innovator's dilemma: when new technologies cause great firms to fail*, Boston. Massachusetts, USA: Harvard Business School Press.

Chung, K-C. (2016). Exploring customers' post-dining behavioural intentions towards green restaurants: an application of theory of planned behaviour. *International journal of organisational innovation*. 9(1). pp. 119-134.

Clark, K. B. (1985). The interaction of design hierarchies and market concepts in technological evolution. *Risomb policy*. 14. pp. 235-251.

Creswell, J., (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. 3 ed. *Washington D.C.: Sage*.

Dance, A. (2017). Engineering the animal out of animal products. *Nature biotechnology*. 35(8). pp. 704-707.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *Computer and Information Systems*, 13(3). 319-340.

Deng, H., Hu, R., Huang, J., Pray, C., Jin, Y. & Li, Z. (2017). Attitudes toward GM foods, biotechnology R&D investment and lobbying activities among agribusiness firms in the food, feed, chemical and seed industries in China. *China agricultural economic review*. 9(3). pp. 385-396.

Dubois, T. D. & Alisha, G. (2017). Big Meat: The rise and impact of mega-farming in China's beef, sheep and dairy industries. *Asia-pacific journal: Japan focus*. 15(17). pp. 1-1.

Easterby-Smith, M., Thorpe, R. & Jackson, P. (2015). *Management & Business Research*, 5 ed. London: *Sage Publications Ltd*.

Edelman, P.D., McFarland, D. C., Mironov, V. A. & Matheny, J. G. (2005). Commentary: In vitro-cultured meat production. *Tissue eng*. 11(5-6). Pp. 659-662.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, 14(1): 532-550.

Fishbein, M. & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wes. In: Ajzen, I. (2012). Martin Fishbein's

legacy: The reasoned action approach. *The annals of the American academy of political and social science*. 640. pp. 11-27.

Fuller, F., Huang, J., Ma, H. & Rozelle, S. (2016). Got milk? The rapid rise of China's dairy sector and its future prospects. *Food policy*. 31(3). pp. 201-215.

Gallen, C., Pantin-Sohier, G. & Peyrat-Guillard, D. (2019). Cognitive acceptance mechanisms of discontinuous food innovations: The case of insects in France. *Recherche et Applications en Marketing (English Edition)*. 34(1). pp. 48-73.

Giampietri, E., Verneau, F., Del Giudice, T., Carfora, V. & Finco, A. (2018). A Theory of planned behaviour perspective for investigating the role of trust in consumer purchasing decision related to short food supply chains. *Food quality preferences*. 64. pp. 160-166.

Guba, E.G., Lincoln, Y.S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*. Thousand Oaks, CA: Sage.

Hamel, G. & Välikangas, L. (2003). The Quest for Resilience. *Harvard business review*. 81(9). pp. 52-63.

Howell, A., C. He, R. Yang & C. C. Fand. (2016). Agglomeration, (Un)-Related Variety and New Firm Survival in China: Do Local Subsidies Matter? *Papers in Regional Science*. 97(3). pp. 485-501.

Johnson, M. W., Christensen, C. M. & Kagermann, H. (2008). Reinventing your business model. *Harvard business review*. 86(12). pp. 50-59.

Kahn, A. (2018). *An introduction to cellular agriculture*. [e-book]. CellAgri. Available at: <https://www.cell.ag/>. [Accessed 2019-02-26].

King, B. J. (2018). Clean meat, via lab, is on the way. *NPR*. 2 January. Available at: <https://www.npr.org/sections/13.7/2018/01/02/575061101/clean-meat-via-lab-is-on-the-way?t=1556124353827>. [Accessed 2019-03-03].

Klepper, S. (1997). Industry life cycle. *Industrial and corporate change*. 6(1). pp. 119-143.

KPMG. (2019). Venture pulse Q4 2018: Global analysing of venture funding. Available at: <https://docs.google.com/document/d/1e7DPjCPFvJq1-LCIoGO6dRZBH6mAzuSou5RWsuk35SU/edit#>. [Accessed 2019-05-27].

Kulviwat, S., Bruner, G.C., Kumar, A., Nasco, S.A. and Clarck, T. (2007). Toward a unified theory of consumer acceptance technology, *Psychology & Marketing*, 24(12). pp. 1059-1084.

Leavell, J. P. (2016). Controlling and informational planned behaviour: Self-determination theory and the theory of planned behaviour. *Atlantic marketing journal*. pp. 81-91.

Macovei, O-I. (2015). Applying the theory of planned behaviour in predicting pro-environmental behaviour: The case of energy conservation. *Acta Universitatis Danubius. Œconomica*. 11(4). pp. 15-32.

- Mattick, C. S. (2018). Cellular agriculture - the coming revolution in food production. *Bulletin of the atomic scientists*. 74(1). pp. 32-35.
- Mattick, C. S., Landis, A. E., Allenby, B. R & Genovese, N. J. (2015). Anticipatory Life Cycle Analysis of In Vitro Biomass Cultivation for Cultured Meat Production in the United States. *Environmental science and technology*. 49, pp. 11941–11949.
- Marcu, A., Gaspar, R., Rutsaert, P., Seibt, B., Fletcher, D., Verbeke, W. and Barnett, J. (2015). Analogies, metaphors, and wondering about the future: Lay sense-making around synthetic meat. *Public Understanding of Science*, 24(5), pp.547-562.
- Milman, O. & Leavenworth, S. (2016). China's plan to cut meat consumption by 50 % cheered by climate campaigners. *The Guardian*. Available: <https://www.theguardian.com/world/2016/jun/20/chinas-meat-consumption-climate-change>. [Accessed 2019-04-12].
- Msaed, C., Al-Kwafi, S. O. & Ahmed, Z. U. (2017). Building a comprehensive model to investigate factors behind switching intention of high-technology products. *Journal of product & brand management*. 26(2). pp. 102-119.
- Nagji, B. & Tuff, G. (2012). Managing your innovation portfolio. *Harvard business review*. 90(5). Pp. 66-74.
- Nelson, A. (2019). Cargill invests in cultured meat company Aleph Farms. Available at: <https://www.cargill.com/2019/cargill-invests-in-cultured-meat-company-aleph-farms> [Accessed 10 May 2019].
- OECD. (2018). *Meat consumption*. Available: <https://data.oecd.org/agroutput/meat-consumption.htm#indicator-chart>. [Accessed 2019-04-26].
- O'Keefe, L., McLachlan, C., Gough, C., Mander, S. and Bows-Larkin, A. (2016). Consumer responses to a future UK food system. *British Food Journal*, 118(2), pp.412-428.
- Paap, J. & Katz, R. (2004) Anticipating disruptive innovation. *Research technology management*. 47(5). pp. 13-22.
- Qu, T. & Harris, R. (2019). Does support from government help firms survive? Evidence on financial and political assistance in China, 1998–2007. *Applied economics*. 51(5). pp. 528-541.
- Rabinovitch, A. (2019). Israel and China sign \$300 million 'clean-tech' trade agreement. Available at: <https://www.reuters.com/article/us-israel-china-cleantech/israel-and-china-sign-300-million-clean-tech-trade-agreement-idUSKCN1BM13E> [Accessed 10 May 2019].
- Rex, J., Lobo, A. & Leckie, C. (2015). Evaluating the drivers of sustainable behavioral intentions: An application and extension of the theory of planned behaviour. *Journal of nonprofit and public sector marketing*. 27(3). pp. 263-284.

Rodriguez Frenández, C. (2018). You will be eating lab-grown meat soon: Here's what you need to know. *Labiotech.eu*. Available online: <https://labiotech.eu/features/cultured-meat-industry/>. [Accessed 8 March 2019].

Rogers, E. M. (1962) *Diffusion of Innovations*, New York: Free Press.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Saavoss, M. (2019). How might cellular agriculture impact the livestock, dairy, and poultry industries? *Choices*. 34(1). pp. 1-5.

Schwartz, S.H. (1977). Normative influences on altruism. *Advances in experimental social psychology*. 10. pp. 221– 279.

Sheeran, P., Gollwitzer, P. M. & Bargh, J. A. (2013). Nonconscious processes and health. *Health psychology*. 32(5). pp. 460-473.

Shepherd, J. D. & Saghaian, S. H. (2015). Risk perception and trust interaction in response to food safety events across products and the implications for agribusiness firms. *Journal of food distribution research*. 46(3). pp. 92-112.

Siegrist, M. and Sütterlin, B. (2017). Importance of perceived naturalness for acceptance of food additives and cultured meat. *Appetite*, 113, pp.320-326.

Sniehotta, F. F., Presseau, J. & Araújo-Soares, V. (2014). Time to retire the theory of planned behaviour. *Health psychology review*. 8(1). pp. 1-7.

Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage.

Sun, Z-C, Yu, Q-L & Han, L. (2015). The environmental prospects of cultured meat in China. *Journal of Integrative Agriculture*. 14(2). pp. 234–240.

Taufique, K. M. R. & Vaithianathan, S. (2018). A fresh look at understanding Green consumer behavior among young urban Indian consumers through the lens of Theory of Planned Behavior. *Journal of cleaner production*. 183. pp. 46-55.

The world bank. (2019). *GDP growth (annual %)*. Available at: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=CN>. [Accessed 2019-04-26].

Tucker, C. A. (2014). The significance of sensory appeal for reduced meat consumption. *Appetite*. 81. pp. 168-179.

Tysonfoods.com. (2019). Tyson Ventures Announces Investment in Future Meat Technologies. Available at: <https://www.tysonfoods.com/news/news-releases/2018/5/tyson-ventures-announces-investment-future-meat-technologies> [Accessed 10 May 2019].

Tuomisto, L. & Joost Teixeira De Mattos, M. (2011). Environmental Impacts of Cultured Meat Production. *Environmental science and technology*. 45, pp. 6117–6123.

United nations environment programme. (2019). *Sustainable food production*. Available: <https://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/sustainable-food>. [Accessed 2019-04-13].

Utterback, J. M. & Abernathy, W. J. (1975). A dynamic model of process and product innovation. *Omega*. 3(6). pp. 639-656.

Vargas, R., Yurova, Y. V., Ruppel, C P., Tworoger, L. C. & Greenwood, R. (2018). Individual adoption of HR analytics: a fine grained view of the early stages leading to adoption. *The international journal of human resource management*. 29(22). pp. 3046-3064.

Verbeke, W., Marcu, A., Rutsaert, P., Gaspar, R., Seibt, B., Fletcher, D. and Barnett, J. (2015). 'Would you eat cultured meat?': Consumers' reactions and attitude formation in Belgium, Portugal and the United Kingdom. *Meat Science*, 102, pp.49-58.

Verbeke, W., Sans, P. and Van Loo, E. (2015). Challenges and prospects for consumer acceptance of cultured meat. *Journal of Integrative Agriculture*, 14(2), pp.285-294.

Wang, J., Wang, S., Wang, Y., Li, J. & Zhao, D. (2018). Extending the theory of planned behavior to understand consumers' intentions to visit green hotels in the Chinese context. *International journal of contemporary hospitality management*. 30(8). pp. 2810-2825.

Weigel, F. K., Hazen, B. T., Cegielski, C. G. & Hall, J. D. (2014). Diffusion of innovation and the theory of planned behaviour in information systems research: a metaanalysis. *Communications of the association for information systems*. 34(31). pp. 619-636.

Wilks, M. and Phillips, C. (2017). Attitudes to in vitro meat: A survey of potential consumers in the United States. *PLOS ONE*, 12(2)

Williamson, O. E. (1975). Markets and hierarchies: analysis and antitrust implications. Free press: New York. In Klepper, S. (1997). Industry life cycle. *Industrial and corporate change*. 6(1). pp. 119-143.

Yang, H., Lee, H. & Zo, H. (2017). User acceptance of smart home services: an extension of the theory of planned. *Industrial management & data systems*. 117(1). pp. 68-89.

Yin, R., (2009). *Case Study Research: Design and Methods*. 4 ed. Thousand Oaks: Sage.

Zhang, K., Guo, H., Yao, G., Li, C., Zhang, Y. & Wang, W. (2018). Modeling acceptance of electric vehicle sharing based in theory of planned behaviour. *Sustainability*. 10. pp. 1-14.

Zhou, Z., Tian, W. & Zhou, J. (2002). The emerging dairy economy in China: Production, consumption and trade prospects. *Australasian Agribusiness*. 10(8). pp. 1-17.

Zorpette, G. (2015). Muscling out meat: Can technology produce a protein good enough to help us control our damaging desire for animal flesh? *IEEE*. 50(6). pp. 64-70.

Appendix A

Cell-based meat			Cell-based dairy		
Company	Founded	Specialization	Company	Founded	Specialization
Balletic Foods	2017	Meat	Clara Foods	2014	Egg whites
Blue Nalu	2017	Fish/seafood	Perfect Day	2014	Milk
Finless Foods	2017	Fish/seafood	Bioscienz	2011	Egg Whites
Fork & Goode	2018	Meat	Real Vegan Cheese	Unknown	Cheese
JUST	2011	Meat	LegenDairy Foods	2019	Milk
Kiran meats	2018	Meat			
Memphis Meats	2015	Meat			
Mission Barns	2018	Meat			
New Age Meats	2018	Meat			
Wild Type	2016	Meat			
Aleph Farms	2017	Meat			
Biofood Systems	2011	Meat			
Future Meat Technologies	2017	Meat			
Super Meat	2015	Meat			
Meatable	2018	Meat			
Mosa Meats	2013	Meat			
Appleton Farms	2017	Meat			
Future Fields	2018	Meat			
Seafuture	2017	Fish/seafood			
Integriculture	2015	Meat			
Shiok Meats	2018	Meat			

Avant Meats	2018	Meat			
Higher Steaks	2017	Meat			
Biftek	2018	Meat			
ClearMeat	2018	Meat			
Innocent Meats	2018	Meat			

The information in Appendix A was retrieved from the following sources; LinkedIn.com, Golden.com, Crunchbase.com, Cellbasedtech.com & Cleanmeats.com.au [All accessed 11 may 2019]

Appendix B

Cell-based meat		Cell-based dairy	
Company	Invested amount	Company	Invested amount
Blue Nalu	4500000	Clara Foods	3500000
Finless Foods	3800000	Perfect Day	61500000
JUST	220000000	Real Vegan Cheese	37000
Memphis Meats	20000000		
Mission Barns	3500000		
New Age Meats	250000		
Wild Type	3500000		
Aleph Farms	14400000		
Future Meat Technologies	2200000		
Super Meat	4200000		
Meatable	3500000		
Mosa Meats	8800000		
Integriculture	2700000		
TOTAL INVESTED AMOUNT	\$291,350,000.00	TOTAL INVESTED AMOUNT	\$65,037,000.00

The information in Appendix B was retrieved from the following sources; LinkedIn.com, Golden.com, Crunchbase.com, Cellbasedtech.com & Cleanmeats.com.au [All accessed 11 may 2019]