Cultural mental models within agribusiness

A qualitative study in an international operating tech-company

Manon Hulshof – s2627728

Faculty of Behavioural, Management, and Social Sciences

University of Twente

1st supervisor UTwente: dr. L. Carminati

2nd supervisor UTwente: dr. A.B.J.M. Wijnhoven

Supervisor research company: T. Seesing

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Acknowledgements

This thesis investigated cultural mental models within agribusiness. More specifically, the study is conducted within an internationally operating, high-tech firm, with sales and demand in the global agricultural sector. For this study, employees and managers from the USA, the Netherlands, and China were interviewed. The eventual aim is to reveal the (cultural) challenges of doing business internationally in this sector, and what aspects should get more attention in the future. This study is conducted in the context of my graduation project for a Master's degree in Business Administration at the University of Twente, Enschede.

My background lays also in the agricultural sector. At home, we have a dairy farm with a cattle of 80 milking cows and 30 animals young livestock. Being born and raised in this sector, encouraged my interest in agribusiness, and therefore also my interest in this research subject. I believe, that the agricultural sector is distinctive from other business sectors. I feel there seems to be a package of specific characteristics that distinguish this sector and the people in it from others.

The research question itself is composed in collaboration with dr. L. Carminati and T. Seesing. The qualitative study is conducted by interviewing employees and managers from several departments. Together, the research question could be answered properly. Therefore, I would like to thank dr. L. Carminati and T. Seesing in particular, for their close supervision, advice, and support during the graduation project. Also, all interviewees and other employees of the research company are thanked for their participation and support.

I hope you enjoy reading this thesis about cultural mental models and their relation to international communication and agribusiness practices.

Manon Hulshof

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Abstract

The importance, complexity, and impact of the agricultural sector have been increasing over the past 20-30 years. As the global population increases, global food consumption increases too. International organisations deal with cultural differences because they work across national borders, but to what extent does this apply to the (high-tech) agricultural sector? The study explored the national culture and the agricultural sector in the Netherlands, the USA, and China. Another type of culture came forward during the study: the organisational culture. These three cultural mental models explained challenges that appear when high-tech agricultural organisations communicate and/or practice business internationally. Following an abductive approach supported with Meyer's Culture Map, data was collected through semi-structured interviews. We found that people's perspectives on other national cultures is different from how that actual national culture perceives it. This causes a mismatch in expectations when communicating and doing business, resulting in misunderstandings and misinterpretations across national borders. There is also a gap found between the national culture and the research company's culture, causing different common ways of how employees fulfil their job, driven by a mentality. It can be concluded that agricultural sector has a separate set of characteristics, beliefs, mindset, manners, and complexity. The composition of the agricultural sector is different per country, which causes challenges in both communication and business practices in international agribusiness. Besides the influencing factors of cultural mental models, we found multiple practical issues bothering a smooth international collaboration. It is challenging to equalize knowledge and information across the global organisation, involving everyone into the organisation on all levels, with consideration of keeping processes efficient. Cultural differences, whether it is in nationality, the business sector, or the organisation, do explain challenges in communication and international practices in high-tech agribusiness. In addition to the practical implications, future research should investigate to what extent the pronounced challenges can be coped with and how this can be done, especially in the little researched agricultural sector. Investigating other business sectors on cultural level could also be interesting.

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1 Introduction

1.1 Situation and background

When an organisation expands internationally is done to improve for example resource allocation, market share expanding, cost reduction, less dependency on the home market, or recruiting new talent. The main motivation is mostly expanding sales and therewith market share (Cavallo et al., 2019). Cultural differences play an important role when internationalising an organisation. Cultural differences have a relation to business operations as it influences the coherence and performance of the organisation (Lozano & Escrich, 2016). When establishing business practices, cultural aspects are involved: norms and values, way of communication, traditions, and independence, can all affect the way business practices are fulfilled.

Yet, communication is only one dimension of culture, and cultural differences can have a different impact on organisations, depending on the firm characteristics, such as the sector or industry they are operating in. For example, Li et al. (2012) reported the challenges of internationalisation for small high-tech companies. Short product lifecycles, lack of resources abroad, and cultural diversities are obstructing small tech enterprises from successfully performing their business practices internationally. Similarly, Cannone & Ughetto (2015) described patterns and processes that high-tech start-ups run through when going international. Several aspects of importance are considered, including cultural differences between the home and host country. Furthermore, whilst internationalisation and cultural differences in the context of innovative, high-tech business, such as innovative renewable energy companies (Manesh & Rialp-Criado, 2017), is discussed thoroughly. However, little is known about how such cultural differences are present in the agricultural sector and how this may affect going international and/or exporting innovative solutions.

According to Davis & Goldberg (p.136, 1957), the agricultural sector/system can be defined as: “the sum of all operations involved in manufacture and distribution of farm supplies, production operations on the farm, and the storage, processing, and distribution of farm commodities”. Farms of all sizes are connected to the agribusiness system and the overall business domain. During the 80s and 90s, business and managerial aspects became more important in agriculture due to governance and cooperation with institutions. There was an increase in managerial and economic perspective within the agribusiness, found in (p.115, Zylbersztajn, 2017): property rights perspective, transaction costs analysis, knowledge, resource-based views, and new institutional economics. This increase of multiple factors and relationships continued over the past years and is nowadays still increasing.

Some of these factors are mentioned by Sporleder & Boland (2013). Seven factors, which will be elaborated on in the Theoretical Background, characterise the agricultural sector and influence its supply chain, in order to establish the peculiarity of the sector in terms of economic performance. The sector is complex, which is the distinctive factor that separates it from the manufacturing and service sectors. Agribusiness is connected to many other chains and sectors, which makes it dependent but also more influential across the globe.

Additionally, the identity of agribusiness is partly affected by Western culture (Fraser, 2001). He elaborated on the effect of Western culture on agricultural culture and how it changed over time. Every culture has its own 'animal mythology' which defines the connection between humans and other sorts that live on earth. This mythology consists of perceptions and opinions concerning keeping animals and derives for the most part from national culture. The perceptions and morals within the national culture and animal mythology conflict with the view that agriculture and the agrifood industry have on this. They see animals as a commercial opportunity, where animals and their animal products are produced, processed, and traded. However, this view must alter alongside the current animal mythology. So, agriculture is dependent on the national culture and the perspective on agriculture from outside the sector.

The agribusiness is chosen because of its global importance in ecology, nutrition, and employment. Moreover, technology developments enable the agricultural sector to innovate quickly and effectively (Cavallo et al., 2019). This makes high-tech firms with (departments) focus(ing) on agriculture more necessary. The increase in demand is mostly the reason why such firms are growing in sales and sometimes expand abroad. Subsequently, such international firms are likely to encounter (difficulties regarding) cultural differences.

To summarise, there is much to find about doing business internationally and the effect of cultural differences. However, when focusing on specific sector characteristics, one could notice a literature gap. This sector is chosen, because of its global importance and impact, and the little literature about it, related to cultural differences. Eventually, a better understanding of different cultures within agribusiness related to communication and business practices may result in a better global agricultural collaboration. Where (animal) food products are sufficiently available for the world's population and produced efficiently and sustainably.

1.2 Aim & research question

The current problem is that cultural differences due to international business operations and their effects are not investigated in the agricultural sector, especially not for firms in high-tech agriculture.

When communicating and doing business internationally, cultural difficulties may arise. This research aims to reveal what cultural mental models are present in the agricultural sector of three countries (the USA, the Netherlands, and China). Besides, the extent to which these cultures explain challenges in the process of communicating and business practices internationally will be investigated. These two aspects together will help high-tech agricultural organisations with international operations acknowledge cultural differences and their effects, resulting in the improvement of global business collaboration. These two aspects are investigated by answering the following research question:

"How can cultural mental model explain challenges in communication and international practices in high-tech agribusiness?"

This research question can fill the research gap described earlier because it is about the description of cultures, related to business practices, specified to the globally important (high-tech) agricultural sector. A sufficient answer to this research question consists of clear descriptions of cultures and their relation to communication and practices in international agribusiness.

1.3 Theoretical & practical relevance

1.3.1. Theoretical relevance

The purpose of this study is to map the cultural mental models in agriculture globally and their link to the challenges in business practices and communication. Currently, the literature covers several aspects of communication and business practices within cross-cultural operating organisations. However, this academic knowledge is not applied to the agricultural sector yet. So, there is a research gap to fill, and conducting this study contributes to filling this gap. The eventual results and conclusions will contribute theoretically to international operating (high-tech-)companies, which encounter difficulties when doing cross-cultural business. So, the study results are generalisable for other innovative, high-tech international companies operating in agribusiness. The theoretical relevance will be further clarified and elaborated on in chapter two of this thesis.

1.3.2 Practical relevance

The practical relevance of this study lies in the combination of complex internationalisation of business practices, ecological factors, and the theoretical gap as described before. With this research, international operating high-tech companies can implement their hardware and software propositions more easily across national and therefore also cultural borders. Acknowledging and insights into different cultures help to strengthen the global collaboration with other international offices. Besides, the study

will reveal practical bottlenecks, incidents caused by cultural differences or working across national borders.

Some critical incidents give already a perspective on the study's topic. For example, international offices in the USA could feel not completely integrated into an organisation with headquarters somewhere across the globe, which could therefore lead to struggles and challenges internally. Next to that, questions and answers during a(n) (online) meeting can be misinterpreted or misunderstood because of cultural differences. Another situation, where at some point, product problems occur in the international office but employees do not want to communicate this and want to solve it on their own, the headquarters in the other country cannot be aware of the problem and cannot do something about it to improve the product, this nourishes inefficient fulfilment of business practices.

The results of the study are desired to give innovative, high-tech companies in agriculture and their employees a better understanding of the existing cultural differences. It must be clear what things are important to take into account when communicating across national and cultural borders. The study delivers a certain base, which prevents employees from making the same, basic flaws regarding cultural differences. This base could be implemented in, for example, an onboarding program a new employee has to attend. Lastly, the practical relevance is generalisable because these types of organisations have to cope with almost the same cultural mental models and additionalities that could influence their business practices.

The thesis is structured as follows. The background situation, research aim and question, and study relevance are explained already. Chapter 2 of this thesis entails the research gap and aligning academic concepts. Subsequently, Chapter 3, explains how this study was conducted and how data was analysed. In Chapter 4 the study results are shown. After that, the discussion of this study is reviewed. Followed by the study's limitations and future research possibilities in Chapter 6. Finally, the thesis will finish with a conclusion in Chapter 7, references used and additional appendices.

2 Theoretical background

This chapter illustrates the research gap found, plus additional theoretical concepts needed to elucidate this study: firm growth, cultural differences, communication and clashes, cultural mental models (in certain business sectors), and the agricultural sector and its culture.

2.1 Firm growth

The growth of a firm is influenced by several different factors and defined by multiple valuation methods. It is crucial how the firm manages some corresponding changes that come with firm growth, such as changes in personnel, changes in processes, changes in communication, etc. (Gupta et al., 2013). According to Ballestar et al. (2020), the growth in productivity in Western countries like the Netherlands is due to innovations and digital solutions in IT firms since the end of the 20th century. For example, technological innovations have a great impact on traditional sectors like agriculture. Moreover, when the firm is in digital transformation, the impact is even higher (Ballestar et al., 2020).

In addition to defining 'firm growth', Rogers et al. (2010) conducted a quantitative study that eventually confirmed Gibrat's law, which states (p. 1547): "firm growth rates should be independent of firm size". When interpreting firm growth, it is important to consider the firm size (Rogers et al., 2010). Because, when a small firm makes a certain growth, that growth is not as big as it would be in a bigger firm. Contrary to Gibrat's law, other studies like Pfaffermayr (2008), conclude that smaller firms grow faster than bigger firms and that the perspectives on Gibrat's law are dependent on the sample selection and its method.

Finally, Audretsch et al. (2014) add another perspective on firm growth. In general, the assumed positive effect of firm growth is not always present. The effect is dependent on the firm characteristics, the market where the firm is located, and the geographical location of the firm. Moreover, just like Rogers et al. (2010), Audretsch et al. (2014) mention that the positive effect of innovation on firm growth is mostly within fast-growing firms, whereas the positive effect would not count for other firms.

To sum up, the literature shows that the term 'firm growth' has multiple connotations, depending on what kind of firm the growth is about and what the causes of growth are. It is important to weigh several aspects to measure, interpret, value, and cope with firm growth the right way. The growth of a firm can result in organisational change, such as internationalisation. It is therefore relevant for this study because expanding across national borders can result in encountering new cultures that will be present in an organisation and affect the daily business practices.

2.2 Internationalisation & cultural differences

The definition of internationalisation is a widely discussed topic in literature (Korsakienė & Tvaronavičienė, 2012). They combined multiple descriptions that are mainly about the organisational process when increasing the involvement in international markets. Moreover, it is about the preparation for international activities, such as mobility, accumulation, and resource development. Korsakienė and Tvaronavičienė (2012) interpret these together as: "internationalisation is the expansion of firm's operations to foreign markets and agrees with the notion that internationalisation could result from punctual and independent actions".

Portugal Ferreira et al. (2014) concluded that cultural models like Hofstede's (2011) are related to the internationalisation of organisations, and therewith concluded that culture seems to be an important factor that needs to be taken into account when internationalising. Moreover, neglecting cultures and their understandings may result in increased difficulties when operating outside national borders, and therefore the neglect of culture affects the overall business performance negatively. Hence, an organisation's international intentions must reckon with the culture(s) in the proposed countr(y)(ies). Literature confirms that without acknowledging and understanding the nation's culture, organisational success is likely to be hampered. In addition, Ulijn et al. (2000) recognise three kinds of cultures: national culture, which can be mapped by cultural mental models like the Hofstede Model (2011), corporate culture or in other words: the organisational culture, and professional culture. Given this, it could be expected that this study will deliver multiple types of cultures, including organisational culture.

When it comes to cultural differences in business, five competencies illustrate how well someone can deal with these differences (Ulijn et al., p.297, 1992): "(a) acknowledging diversity, (b) organising information according to stereotypes, (c) posing questions to challenge the stereotypes, (d) analysing communication episodes, and (e) generating 'other culture' messages". These five aspects are key when cultural differences occur anywhere in an organisation and help to describe how a person is related to cultural differences (Beamer, 1992). The five aspects are of value for this research because it shows some measures of how people can acknowledge cultural differences and improve their attitude towards them.

Cultural differences affect daily business practices, such as sharing information (Forstlechner & Lettice, 2007). The paper delivers an analysis of different regions in the world, distributed per generally applicable culture. The different regions: Asia, the United Kingdom, German Europe, Remaining Europe, and the USA have different approaches to sharing knowledge most effectively. For example, in Asia and the USA, where it is most effective to motivate people via authority and a charge code to record time. However, in Germanic Europe and the United Kingdom, it is most profitable to give people a certain

contribution that is taken into account in the appraisal (Forstenlechner & Lettice, 2007). It shows that different regions in the world with different cultures ask for different ways of approaching, treating, and communicating. The connection between the research of Forstenlechner & Lettice (2007) and this research is particularly found in the diversification of nations.

In addition to country differences, Scholtens & Dam (2007, p. 281) conclude that: "the location where the firm is headquartered appears to be a significant factor when it comes to the assessment of the firm's communication, implementation and the systems of the code of ethics (comprehensiveness), its governance of bribery and corruption, and its human rights policies" (Scholtens & Dam, 2007).

Lastly, organisations have to cope with cultural differences when being in the process of formulating and implementing a certain strategy. As Fatehi stated:(p.31, 2016): "scanning behaviour, information selection, interpretation, validation, and prioritising". All process steps involve perception and thinking, which are influenced by the concerned culture. An environmental scan can help in forming an organisational strategy, which is used in Fatehi's paper to bring possible cultural implications to light. This scan is based on some cultural process steps: behaviour, information selection, interpretation, validation, and prioritising. Fatehi (2016) concludes that there is a common goal when globalising as an organisation: gaining competitive market share. However, the road towards this goal is not common. "International managers with different cultural backgrounds approach their jobs from different cultural mental frameworks" (Fatehi, 2016, p.35). There are differences in strategy-forming between the East and the West. Overall, it is important to acknowledge that there are differences.

In alignment with the proposed research question, this article encourages acknowledging cultural differences and coping with them via process steps. However, the theory does not describe any differences within the business world that are based on the nature of a similar group of organisations. To conclude, the literature is rich in studies on cultural differences in a business-related environment. However, less research has been conducted with regard to these differences in relation to a more specific branch or sector like the agricultural sector, which indicates a research gap that could be filled by conducting this research.

2.3 Communication & cultural clashes

Communication is a broad, comprehensive concept that is of evident importance for this research. However, research has struggled to provide a univocal definition of it. Dance (1967), in his Helix Model for a better communication process, described three reasons that complicate the process of defining communication well; (1) level of observation, (2) intentionality, and (3) normative judgement. More recently, Littlejohn & Foss (2010) also illustrated different kinds of communication theories, with different

definitions of communication. “We hope this range of definitions help you determine the definitions that resonate with you, why those definitions make sense to you, and where your interests fit within the broad area called communication theory” (p.5, Littlejohn & Foss, 2010).

Likewise, Staff et al. (p.117, 2014) tried to summarise several different interpretations of what communication is and noted that: ’to communicate’ means ‘to make common’, or ‘to make known’, ‘to share’, and includes verbal, non-verbal and electronic means of human interaction”. They also carried on: “any act by which one person gives to or receives from another person information about that person's needs, desires, perceptions, knowledge, or affective states”. Additionally, communication occurs by different means: voice, telephone, email, television, advertisement, newspaper, facial and body language, and gestures. In short, to pass information there needs to be a sender and a receiver (Staff et al., 2014). This knowledge is of relevance for this study because the funnel begins broad and narrows as the next paragraphs will show.

In this research, the concept of ‘communication’ is narrowed to: ‘cross-cultural communication in international business practices’. In an earlier paragraph of this proposal, several examples and effects of cultural differences in organisations are mentioned. To continue on this, literature about communication between different cultures will be investigated regarding daily business practices. When it comes to communication within business practices, Staff et al. (2014) mention that the vision and mission of the organisation must be messaged to all employees. Additionally, Ulijn et al. (2000) stated that innovation as a business practice is closely connected to communication since (1) innovation must be part of the organisation’s vision and mission, (2) innovation comes with a more diverse group of people that could require a different leadership style, and (3) to link communication to cross-cultural, internationalisation, and business practices, Ulijn et al. (2000) describe multiple business practices that could occur when operating internationally. Practices and events as continual innovation, global markets, strategic planning, and (technological) change.

Staff et al. (2014) mention different causes of communication challenges. First, language differences can cause problems when communicating, especially when the information contains jargon or other difficult aspects causing misinterpretation. Second, the environment the message is transmitted is important. If it is bothered by noises in the background it could affect the clarity between sender and receiver. Third, the channel with which the information is sent must be properly working and rightly chosen. Bad connection, faltering devices, or incorrect facial expressions can damage the clearness of the message. Fourth, the personal characteristics and current behaviour of receiver and sender are of importance, since one could alter the actual message containments in a way it could favour personal

interests or goals. Last, the amount and complexity of the steps being taken to transfer the message can lead to badly received and/or misinterpreted messages (Staff et al., 2014).

Given that communication challenges can be the cause of misunderstandings, it is important to understand the term 'misunderstanding'. It has multiple definitions, which are discussed by Lewkowicz et al. (2008), who start with what the Free Dictionary states: "a failure to understand or interpret correctly", or "a disagreement or quarrel". The dictionary links misinterpretation to interpretation, imbroglio (= an embarrassing misunderstanding), misconstruction (= wrong connection of words/meanings/actions), and misreading. Additional scientific definitions and foundations resulted in a composing table of different layers and causes of misunderstandings.

Table 1. Misunderstanding layers and their causes

Semiotic layer	**Misunderstanding causes**
Technical layer: the physical media that carry the messages	Incomplete and distorted sounds, inference of noise, distortion or corruption of files and text
Empirics layers: Human use patterns of messages	Unclear speech and accents, lack of redundancy and feedback in communication.
Syntactic layer: The ways how information is coded and formalised	Poor and incomplete coding of message and knowledge; use of nonstandard codes or codes that are uninterpretable by the target audience.
Semantic layer: The meaning of messages in a given linguistic context	Use of complex jargon; unclear expression of vision; (over) complex arguments; information overload
Pragmatic layer: The behaviour a certain message wants to initiate at its human receiver	Conflicts of interests; distorted interpretations because of biased views.
Social norms layer: The social contextual rules that govern or enable effective communication between message exchanging people	Differences in behavioural norms; nonverbal messages may have different meanings among represents of different cultures

Note. Reprinted from *Misunderstandings in Global Virtual Engineering Teams: Definitions, Causes, and Guidelines for Knowledge Sharing and Interaction*, by Lewkowicz et al, 2008, *Methods and Tools for Effective Knowledge Life-Cycle-Management,* p.145-157

Next to the layers and causes, Lewkowicz et al. (2008) indicate multiple measures with which these misunderstandings can be prevented. These measures are linked to general communication guidelines which could be applied, especially when communication appears to be cross-cultural. English is in many countries, not the common language yet usually the common language when doing business internationally. Draghici (2007) addressed skills to improve the way of bringing over a message. It is influenced by the speed of talking, the wording, and the interaction with the receiver. It is important to, where needed, speak slower than normal, avoid negativity and slang, give others chances of speaking,

and ensure the other party understood. All, with consideration of cultural etiquettes and traditions. Communicating in person is advantageous in comparison to online. Although, when a network of e.g. employees has to work remote and therefore online instead of in person, 'social software tools' help in improving communication and information shared across different cultures (Lewkowicz et al., 2007).

To conclude, international operating organisations may encounter challenges when communicating. There is a link between cross-cultural communication and international business practices. Moreover, literature considers proper communication across different cultures within the same organisation as important. There are some tools and ways to enable efficient communication, online and in person, which is related to working with international employees where misunderstandings occur easily.

The theoretical background shows that there is still missing literature about cultural frameworks regarding the agricultural sector. The assumption is that the culture within the agricultural sector is partly dependent on the national culture, but that it differs from other business sectors. This assumption is based on the life experiences of the researcher. The assumption can either be corresponding to or contradict actual study results.

2.4 Cultural mental model: Meyer's Culture Map

Rook (2013) provides a rough definition 'mental model'. When one wants to understand the actions and mind of an individual, mental models can come in handy. The concept of a mental model is partly ambiguous (Rook, 2013). The literature agrees on mental models being held internally and that it affects the way an individual acts. Also, multiple cultural mental models can indicate the cultural characteristics of certain groups, regions, and/or organisations. The cultural mental model conducted by Meyer (2014) will be used in this study to frame the multiple cultures within the three studied countries because it emphasises many aspects when working together in teams and how this is affected by culture.

Meyer's Culture Map (2014) derives from the chance to learn and teach about cross-cultural challenges in management. It consists of eight scales that managers must consider: communicating, evaluating, persuading, leading, deciding, trusting, disagreeing, and scheduling. With that, managers can execute their responsibilities more effectively across a culturally different working team. It is one of the most important frameworks that account for communication.

The Culture Map describes a culture in eight scales with different extremes. Communicating is measured between low-context and high context. The first means communication is going more directly, the latter stands for communication with observations of certain expressions, body language, and intonation. Evaluating can be rated in the way negative feedback is mostly given: directly or indirectly.

Next, persuading, is about what aspect one is earlier tended to convince someone else about, their principles or their applications. Followed by leading, the leadership style which is most common in the country, from egalitarian to hierarchical. Subsequently, a country's way of deciding can be more consensual or top-down focused. Scale six, trusting, measures whether trust arises from fulfilled tasks, or from the relationship that is built. The former last is about disagreeing. It judges the common behaviour of people when one disagrees with something: confrontational, or more or less avoiding the confrontation. Lastly, the Culture Map discusses whether people of a certain country schedule more linear, or flexible. Figure 1 gives an overview of Meyer's description of the Chinese, American, and Dutch national cultures, which is based on the corresponding book: The Culture Map (Meyer, 2014).

Figure 1. National cultures of China, the Netherlands, and the USA

Note. Reprinted from *The Culture Map,* by Meyer, 2014, *PublicAffairs*

When certain cultures are mapped in mental models like Meyer's (2014), one could expect challenges when cultures with differences communicate with each other. Ishida (2010) wrote about computing and communicating across international cultures, containing an article from Jokinen & Allwood (2010). The article defines intercultural communication as (p. 65): "communication between people who do not have the same ethnic or national cultural background, e.g. communication between a Chinese person and a German person". Hence, it indicates that cultural background is related to communication. Additionally, Jokinen & Allwood (2010) address multiple studies that are conducted on this topic.

Intercultural communication studies are conducted with questionnaires concerning values and attitudes, or by observing the communicative behaviour of people. Thus, intercultural communication can be verbal or non-verbal (Jokinen & Allwood, 2010).

Regarding intercultural communication, St. Amant & Flammia (2016) state multiple challenges that come with that, caused by different expectations and interpretations of information. To communicate information successfully across readers from different cultures, it is important to consider the following aspects when documenting information; the structure, amount, organisation, terminology, plus the overall link between texts and graphics. When these are considered properly, it is more likely that individuals with different cultural backgrounds take the information the same way. However, Amant & Flammia (2016) draw attention to a further challenge after the information is documented carefully. That challenge derives from cultural behaviour. For instance, the one person with a high-context way of communicating may interpret certain information differently from another person who communicates via low-context characteristics.

2.5 Cultural mental models in business sectors

Recurring the cultural mental model of Meyer (2014), some studies describe and investigate the implementation of such a mental model in different business sectors. Detert et al. (2001) investigated the interaction between implementing quality management and organisational culture within secondary schools in the United States. The paper addresses the values and beliefs of this certain organisational culture, education, as a cultural mental model. Eventually, the research results in a list of values describing the culture within the educational sector. Besides, Detert et al. (2001) added four propositions to embed the values into the quality management context.

In addition, Igo & Skitmore (2006) described the culture of a construction consultancy company in Australia using Quinn & Rohrbaugh's (1983) Competing Values Framework, and Cameron and Quinn's Organisational Cultural Assessment Instrument (2006). These determine the overall organisational culture of the company, as seen from the outside. Furthermore, the culture of the different employees is conducted to execute projects more efficiently. To conclude, both models gave a precise and elaborate description of the corporate culture within and without a consultancy company in the construction sector. For this study, these two cultural mental models will not be used, because they are not as recent as Meyer's (2014). Moreover, the two frameworks have less focus on communication regarding culture than The Culture Map of Meyer (2014).

Lastly, Brockmann & Birkholz (2006) assign three different cultural frameworks to elaborate on the culture of civil and mechanical engineering, namely: Hofstede (2005), Riley / Clare-Brown (2001), and

Woodward (1965). Through these frameworks, multiple aspects of culture are appointed. For example, centralisation of work, communication through the organisation, structure, newness and innovativeness, and control rate. The frameworks are applied to both mechanic and civil engineering, resulting in a complete definition of both cultures that appear within the engineering sector. Moreover, the frameworks are further explained in the daily practices of these kinds of organisations (Brockmann & Birkholz, 2006). It is therefore important for this study that the chosen framework translate to the daily business practices. This study is mostly about communication, Meyer's Culture Map (2014) has dimensions that refer to working together in cross-cultural teams and is therefore fitting to the research problem.

Whilst the relationships between culture and different business sectors working internationally have been researched extensively, there is a lack of studies on how cultural mental models may influence communication and business practices within the agricultural sector.

2.5 The agricultural sector and its culture

Since this sector is responsible for delivering products that nourish people across the world, it is an internationalised sector. People all over the world are dependent on and connected to agriculture. In terms of food and drinks but also when it comes to employment opportunities. In 2012, 19% of the world population was directly connected to agriculture and farming. Agriculture supplies more than animal and plant products for human consumption. It delivers feed for animals, fuel for transport, fibre for clothing, and much more (Alston & Pardey, 2014).

Agriculture originates from Latin, where 'ager' means field, and 'colo' means cultivate (Harris & Fuller, 2014). In addition, the Oxford English Dictionary (1971) gives the following definition: "The science and art of cultivating the soil, including the allied pursuits of gathering in the crops and rearing livestock (sic); tillage, husbandry, farming (in the widest sense)". Harris & Fuller (2014) use a combined definition where the focus lies on cultivation and domestication (p.3): "agriculture is a form of land use and economy that resulted from the combination of cultivation (a bundle of human actions focused on preparing soil and planting, tending, and harvesting plants) and domestication (a bundle of genetic and morphological changes that have increased the ability of plants to adapt to cultivation)". Besides a definition, agriculture has multiple possible qualifications: incipient, proto, shifting, extensive, or intensive.

Agriculture has developed a whole value chain. Gunderson et al. (2014) described this value chain as consisting of more than fibre and food only. A value chain itself has some common outlines applicable to most the business sectors (p.3, Clay & Feeney, 2019): 1) inputs, outputs, and activities that generate a transformation; 2) agents that perform certain activities and have vertical and horizontal bonds; 3) value

addition activities and value allocation; 4) a final product or group of final products; 5) a group of consumers at the end of the chain; 6) problems and opportunities that are shared by all the agents; 7) power relations and governance mechanisms. Gunderson et al. (2014) place the agribusiness sector in a web of many relationships that are made up of genetics and seed stock firms, input suppliers, agricultural producers, merchandisers or first handlers, processors, retailers, and consumers, all in an international context. The sector is dependent on consumer demand. As this demand increases, decreases, or differs, it has a direct and indirect impact on the sector. Agribusiness has different perspectives and has a broad and diverse impact on the world. Gunderson et al. describe five sector characteristics to make it more concise (p.51):

1. Unique cultural, institutional, and political aspects of food, domestically and internationally;
2. 'Uncertainty' arising from the underlying biologic basis of crop and livestock production;
3. Alternative 'forms of political intervention' across subsectors and nations;
4. Institutional arrangements that place significant portions of the 'technology development process' in the public sector, and;
5. Differing 'competitive structures' within the stages of the sector.

Similarly, Sporleder & Boland (2011) investigated seven 'fundamental economic characteristics' of agribusiness, which explain the complexity of the sector and why it distinguishes itself from other sectors.

1. "Risk Emanating from the Biological Nature of Agrifood Supply Chains"
   Dependence on weather, biological diseases among plants or animals, pricing based on demand and supply, seasonality and perishability of products, and food safety conditions throughout the whole supply chain.
2. "The Role of Buffer Stocks with the Supply Chain"
   Contracting of non-perishable and perishable products because buffer stocks influence the prices of agrifood. Besides, buffer stocks at manufacturers can be used as a safeguard of quality, quantity, and price risks.
3. "The Scientific Foundation of Innovation in Production Agriculture has Shifted from Chemistry to Biology"
   The first era of agriculture replaced horsepower with machinery power. The second era consisted of mainly chemical innovations, such as fertilizers, pesticides, and animal antibiotics to increase scalability. The third era is called agricultural biotechnology, where consuming animal products requires consideration of human health and safety.

4. “Cyberspace and Information Technology Influences on Agrifood Supply Chains“

   Innovations on this topic enable a more efficient way of transport and communication, just-in-time deliveries, reinforcement of order possibilities, traceability of products, higher quality of products, and lower transaction costs.

5. “Prevalent Market Structure at the Farm Gate is Oligopsony”

   An oligopsony is a market with only a small number of buyers, which was the case many years ago which resulted in a “complex of institutional and legislative aspects that serve to make commodity marketing an exclusive feature of Agrifood supply”.

6. “Relative Market Power Shifts in Agrifood Supply Chains Away from Food Manufacturers Downstream to Food Retailers”

   Supermarkets, restaurants, and other food retailers get increasingly more market power within the agrifood supply chain. These parties are closer to the consumer and have access to consumer demand data. Sometimes their power results in new regulations causing agrifood to be imported and exported more, while it fits properly to the consumer demand.

7. “Globalisation of Agricultural Production and Agrifood Supply Chains”

   Globalisation is enabled by technology, increases the market extent, increases scalability, increases competition and capital flows, which results in political agreements and an increase of market access across all countries involved. Institutions such as the World Trade

   Organisations enable globalisation of agricultural products and enable therefore the speed, cheapness, safety, and accessibility of these products.

Literature establishes the global impact, distinctiveness, and overall importance of the agricultural sector. The world population is fed and can survive because of agriculture. The agriculture value chain and its complexity distinguish this sector from other sectors operating internationally. One aspect of agricultural complexity which is not yet remarked by literature, is culture. Still, culture and cultural differences may have an impact on this sector and its operations.

Agriculture can be affected by the national or regional culture. Such as the Western culture and animal mythology through the years affected the way agriculture is practiced (Fraser, 2001). Additionally, Burton et al. (2008) cited multiple examples exploring the attitude of farmers and their motives towards this attitude. In Austria, the farmers preserve decent landscapes instead of a biodiverse, flourishing landscape. In Finland, the measures regarding biodiversity and its practicalities did not affect farmers understanding of it and did not stimulate enhancing it. In Switzerland, the subsidised practices did not change farmers’ vision of the necessity of ecology, they mainly used the subsidy because of economic

reasons. Also, in the Netherlands, the motivation of producing as much and earning as much as possible overpowers the motivation of increasing biodiversity. However, there are also studies confirming that when farmers are once engaged and involved in such motivation, the conservative vision alters to a more environmental and biodiverse one. However, whether agriculture is perceived as conservative or environmental, the actual description of a culture is more about social aspects rather than the way agriculture is practiced and the motive behind it.

Another perspective on culture in agriculture is the investigated role of social capital (Rivera et al., 2018). Culture and tradition are one aspect of social capital in their study. It elaborates on how society in different countries reflects on, relates to, and looks at the agricultural sector in the concerning country. The insights are about how society and the sector interact with each other. Unfortunately, it does not give any insights into the values, norms, traditions, etc. of the agricultural sector.

To conclude, the agricultural sector is of great impact on the world. It is a spider in a web of various other sectors. Moreover, the impact on the environment is also particularly present. The sector is particularly complex because of the many factors affecting the agricultural supply chain, of which some are uncontrollable. There is little information found in literature about the actual culture within agriculture, which makes the research topic relevant as contributing to literature and practice because a decent culture description may improve managerial aspects and therefore the overall performance within the sector.

3 Methodology

This part of the thesis entails a description of how the study was conducted to answer the research question: "How can cultural mental model explain challenges in communication and international practices in high-tech agribusiness?". The study aims to explore and determine how different cultural mental models may relate to challenges in communication and business practices. Data has been collected and analysed as enlightened in the next paragraphs.

3.1 Research design

The study has a qualitative approach, non-numerical data has been collected. Choy (2014) compared qualitative and quantitative approaches and analysed their strengths and weaknesses. A strength of qualitative research is the possibility to investigate the perspectives of persons on a certain topic or situation. One aspect to take into consideration is the possible nuance found in the qualitative data in comparison to quantitative data. In addition, a qualitative approach enables the researcher to investigate underlying cultural aspects that explain the collected data in qualitative research. Participants of qualitative research are allowed to suggest new ideas, patterns, or additional information. This enables data to be meaningful and of broad perspective, where emotions and feelings can be included (Choy, 2014). Especially the last part was of value for this study because cultural mental models are broad, including emotions and feelings, which is particularly important to this study. This qualitative study is then abductively approached. Bamberger (2018) elaborates differences between deductive, inductive, and abductive reasoning in research (Table 2).

Table 2. Differences between deduction, induction, and abduction

	Deductive approach	**Inductive approach**	**Abductive approach**
Aim	Demonstrating that when a stated hypothesis is true, it is definitely not false, plus showing validity and generalisability of the statement →Claims are strong	Develop a claim which is unlikely to be false, plus showing a possible generalisability of the claim →Claims are moderate	Developing explanations which are exploratory of nature and sometimes plausible →Claims are weak
Purpose of theory	Providing hypotheses to challenge	Framework to support systematic approach of study, plus generating generalisable explanation for this study	Providing assumptions and fields to explore, proposing subjects to sample
Data usage	Disproving of null and/or alternative hypotheses	Validating a generalisable conclusion when premises are confirmed	Describing phenomena, reveal plausible claims, shrinking the amount of potential explanations

Interpretation	Examine presumed relations through falsifiability of tests	Showing probable relations and conclusions	Establishing patterns, mechanisms, processes, models

Note. Reinterpreted from *AMD-Clarifying what we are about and where we are going*, by Bamberger, 2018, *Academy of Management Discoveries,* Vol. 4, p.2

The objective of this study is mostly related to abductive reasoning. The cultural mental model gives explanations for possible difficulties that may occur when encountering cultural differences. Abductive research enables the exploration of new experiences and stories from the research subjects. One of the downsides of abductive reasoning is the weak knowledge claims. Findings and conclusions are not hard evidence of facts, but assumptions to investigate where difficulties occur within the international high-tech organisation. In other words, the results identify certain cultures and get a linkage with communication and business practices (Bamberger, 2018).

Inductive or deductive study approaches are less applicable for this study (Bamberger, 2018). This study started with experiences, puzzles, and assumptions which are being tried to justify as correctly as possible. However, with culture, it is not possible to get 100% correct conclusions because of soft aspects such as emotions and morality. That is why abductive reasoning is most appropriate for answering the research question.

3.2 Research instrument

Conducting a study with an abductive approach can be done in different ways. For this study, semi-structured interviews are used to collect all data. 14 employees of the research company have been interviewed. These employees have different nationalities, work in different countries, having different functions.

The biggest downside of semi-structured interviews is that they are time-consuming, work-intensive, and in need of refined analysis. The interviewer was known with the topic that was discussed and knew all questions by heart. Moreover, a well-prepared interview is more likely to succeed than a deficient prepared interview. A difficulty in semi-structured interviews, which occurred also during this study, is to stick to the original topic. Besides the disadvantages, an advantage of this interview structure is that there is room for probing, or open-ended questions, which was useful for this study.

Furthermore, the pre-set questions enabled easy comparison between the different interview answers (Adams, 2015). Also, the critical incident method is used. It is originally established by Flanagan (1954) and reappraised by Bott and Tourish (2016). The technique consists of procedures where the researcher annotates certain important observations, situations, or stories (in total: incidents), which have many contributions to the study aim and research question.

3.3 Data collection & sampling

All data is collected within a research company that fits the characteristics described earlier: innovative, high-tech, international operating, with a department in agriculture. A detailed description of the research company and its challenging situation is given hereafter.

3.3.1 Research company

The research company where the study is conducted is originally Dutch with headquarters in the Netherlands. The company develops technologies (hardware and software) in various branches in order to simplify, improve, and optimise business practices. Its vision is to help people in increasing their productivity and get the most out of themselves. With ten offices worldwide, over 800 employees, and almost 190 million in revenue, the research company can be considered a big player in the technology market. Internally, there are seven 'business units', in order to structure their products towards the desires of different global markets. This study is conducted within the business unit Livestock Management (LM).

In the last couple of years, LM has been growing strongly in the amount of software and hardware solutions and sales. Therefore, there is also an increase in the number of end-users, business partners, and employees worldwide. Currently, LM experiences challenges with communicating and implementing business practices from its headquarters, to its international offices in the USA and China. For example, during the COVID-19 pandemic, the ability of online meetings and working from home had to grow. All employees have developed their skills to meet online, it has become easier to talk to each other (internationally). However, it made communication less personal and more direct. This is not always as effective concerning the cultural differences between the three countries. Next to that, most of the employees know about cultural differences. However, they are not always acknowledging and handling these cultural differences with care to bridge the complexities caused by them. Therefore, the research company will be used for conducting (agricultural) mental models and how this relates to the overall communication and business practices in similar industries.

LM has similar departments as other business units within the research company, which makes the study results generalisable. Moreover, similar companies with high-tech propositions (in agriculture) such as Philips, IDESS Laboratories, Bunge, and Ecolab, have similar tasks and responsibilities to fulfil, especially when doing business internationally. In the next two sections, the research countries, chosen participants, and interview structure used for this study is elaborated.

3.3.2 Sampled countries

This study is conducted with interviewees working from offices in the USA, China, or the Netherlands. The Dutch team is responsible for all main decisions and strategies such as product management and operations. Whereas the American and Chinese teams are mainly concerned with day-to-day practices directly at farms in terms of support and sales (which also happens within the Dutch team). There is communication between the Dutch team and the two international teams about the daily issues and processes regularly. The practical reason why these countries are chosen is that LM is most present in the USA, China, and the Netherlands regarding sales, market share, and market opportunity. Furthermore, the employees working in those three countries were available and willing to participate in the study.

Besides the practical reasons, national history has an influence on the degree of agriculture in a country (Van Arendonk, 2015). A case study showed that early industrialised countries are more likely to possess highly developed agriculture, in terms of agricultural GDP and employment during 1995-2010. Van Arendonk (2015) concludes that when China started developing agriculture, the USA and the Netherlands were already at a high level of agriculture. Despite this, China is rapidly catching up. The next three sections elaborate additionally on why this study has focused on the USA, China, and the Netherlands besides their importance for world agriculture and their relevance regarding the cultural differences among them.

Employees work with other employees, partners, customers across national borders, and therefore also cultural borders. Hence, business practices are done in circumstances of cultural differences. A globally-known framework that explains these differences between countries is the Hofstede model (2011). This model discussed six dimensions to describe a country's culture: Power Distance, Individualism, Masculinity, Uncertainty Avoidance, Long Term Orientation, and Indulgence. Next, a comparison between the USA, China, and the Netherlands is made regarding this cultural model.

When comparing the three cultures, some big differences appear. The rate of power distance is almost the same in the USA as in the Netherlands. However, in China, there is a higher degree of power distance. Consequently, in China, it is more known and accepted by less powerful units that power is distributed unequally.

The differences are smaller in the degree of uncertainty avoidance, where the Netherlands scores the highest of the three countries. Thereafter comes the USA, and the lowest degree of uncertainty avoidance is found in China. There is not particularly much uncertainty avoidance in one country, but the Netherlands is most eager to set rules, plan time efficiently, and be punctual.

A third dimension, individualism, is also quite the same between the USA and the Netherlands. In these two countries, there is a high degree of individuality. Inhabitants are preferring to take care of themselves and their own family only. Meanwhile, in China, there is a collectivistic preference where individuals act in the interest of the group and its goals.

Next, masculinity, in which China and the USA have almost the same degree. Both countries are rather masculine, meaning that society is success-oriented. People are driven, competitive, ambitious, and aiming to be the best. However, in the Netherlands, society is feminine, meaning that people are driven by things they like to do, in order to achieve the best quality of life.

The former last dimension is about the long-term orientation a country has or does not have. China is the most long-term oriented, subsequently the Netherlands, and lastly the USA, which is the country with a short-term orientation. Chinese society is mainly focused on events that happened in the past, in order to deal with events that happen in the present and will happen in the future. The USA is more short-term oriented. In business, the results and statements are conducted quarterly. Results are supposed to be gained quickly. The Netherlands is less long-term oriented than China.

Lastly, the dimension 'indulgence' shows the extent to which persons are trying to master their personal urges and demands, based on their upbringing. The two extremes in this dimension are indulgent versus restraint. The USA and the Netherlands are both qualified as indulgent. People are tended to satisfy their personal desires and society can be considered 'human'. On the contrary, in China, where society is very restrained, there is more pessimism and people feel that their desires are hindered by social norms and values.

To summarise, the USA, China, and the Netherlands are chosen as country samples because of their differences and similarities when the national cultures are compared to each other. Moreover, these three countries are important players in the international agricultural market. These two perspectives affirm the three countries appropriate for this study.

3.3.3 Interview structure and participants' demographics

Sampling the research participants for semi-structured interviews is done by combining purposive and snowball sampling. Mack et. al (2005) elaborated on both approaches. Purposive sampling is used in this study because the interviewees are selected based on specific criteria (see enumeration below). Snowball sampling is used in this study when during interviews other possible interviewees were addressed, giving more relevant information regarding this study. The selection of interviewees was based on a set of predefined characteristics (purposive sampling).

- The interviewee is working as and/or working with an employee or manager within Sales Operations and/or Technical Support;
- The interviewee is working for at least half a year at the research company;
- The interviewee works in the USA, the Netherlands, or China, and should be familiar with one or both of the two other cultures, and;
- The interviewee is willing to share their own experiences concerning the research topic

The interview questions were structured through the table found in Appendix I. The interviews with interviewees from the USA and China were conducted in English. Dutch interviewees were interviewed in Dutch. This is because a person speaking in his or her mother language enables a better expression of what is meant, than when this person speaks in a second or third language (Kashiha & Chan, 2015). There were conducted 14 interviews in total, three participants from China, five participants from the USA, and six participants from the Netherlands. Before an interview, participants received three additionalities: a participants information form, a participants consent form, and a questionnaire with demographic questions.

The participants' information form entails general information about the research. The participants' consent form consists of practicalities regarding the interview and their participation in the research, so the ethical responsibility of the study and researcher is ensured. The short demographic questionnaire gives some general information about the sample pool, the questionnaire can be found in Appendix II. Names are anonymised and where needed substituted with pseudo-names or business functions in the thesis.

Of the 14 participants, 12 were male and 2 were female, with an average age of 42 years. The participants have been working at the research company for between 1,5 and 28 years. They are currently working for Technical Operations, Sales Operations, or another department within Livestock Management. Lastly and most importantly, almost everyone experiences regularly or often challenges that are caused by cultural differences. This shows the study's relevance.

3.4 Data analysis

All interviews are transcribed in Dutch or English. Dutch interviewees lead to Dutch transcriptions, American and Chinese interviewees lead to English transcriptions. The inductive analysis of the transcriptions is done through Thematic Analysis (Braun & Clarke, 2006). Clarke & Braun (p. 297, 2016) state that thematic analysis is: "a method for identifying, analysing, and interpreting patterns of meaning

('themes') within qualitative data". The thematic analysis consists of six different steps. The next paragraphs will explain the different steps and how these were consorted with during the study.

The first step is to familiarise yourself with your data, which means that the verbal data will be transcribed, read (and re-read), first findings will be written down. All interviews were recorded. An automatic transcription tool in Microsoft Word wrote down most things that were said. The researcher just had to relisten the recording and adjust the transcription where needed.

In the second process step, the transcribed data will be shaped into codes. Hence, relevant data will be connected to a certain code. Coding the interviews is done in Atlas.ti, a tool to structure qualitative data. All relevant sentences, phrases, and paragraphs in the transcriptions are selected and turned into quotations. These quotations summarise what is said, with the use of interviewees' wording.

Step three is about developing themes deriving from the initial codes. The short quotations are linked to codes. Here, the distinction between the three different sample countries is made. All interviews match some mutual topics, but coding the quotations has happened per country separately because the research aims to describe the cultures of the USA, China, and the Netherlands separately.

In the fourth step, the themes are reviewed on realness and possible overlap or abundance. The number of themes can be determined when a researcher considers internal homogeneity within a theme and external heterogeneity between themes (Patton, 1990). This means that data within a theme must coincide with each other, plus the data between the themes should be different from each other. The codes are homogenetic, consisting of quotations that coincide with each other, linked to the code name. The themes, or code groups, consist of multiple codes which coincide with each other, linked to the code group. These code groups aren't heterogenetic, which was kind of expected because culture is a broad, subjective, and emotional concept where one quotation can be linked to multiple codes and code groups. After linking the codes to code groups, an overview of the data is created, where it is mapped like a funnel. Data merged from very specific, to broader, overarching themes.

Step five is about defining and refining the thematic map. Identify the real importance behind the conducted themes. This can be done by going back to the data within a theme, and giving each theme a scope: what does the data within the theme tell and what does it not tell? Defining and refining the data described in the funnel can be found in Chapter 4.

The last step of thematic analysis is where the actual analysis will be done. As Braun & Clarke (p.93, 2006) state: "It is important that the analysis (the write-up of it, including data extracts) provides a concise, coherent, logical, non-repetitive and interesting account of the story the data tell within and across

themes". This last step is found in Chapters 4 and 5, where the analysed data supplies an answer to the research question.

The Thematic Analysis approach is inductive, to make this study abductive, a deductive approach has been added. In the results, Meyer's Culture Map (2014) sets the base for answering the research question. The framework will be filled in with the available data, which makes it deductive. Therefore the combination of Thematic Analysis and Meyer's Culture Map (2014) makes this study abductive.

3.4.1 Gioia methodology

A well-known method to structure the results of qualitative data during thematic analysis is the method of Gioia et al. (2012). The methodology aims to give qualitative studies more scholarly rigour, without losing the emotional and human nature of interview answers. Moreover, the methodology shows how data transforms from raw, to manageable. The process in between creates reliability of data analysis because it is shown and transparent to the readers.

The Gioia methodology consists of 1st-order concepts, 2nd-order themes, and aggregate dimensions (or 3rd-order themes) (see Figure 2). The 1st-order column with concepts aims to analyse mentioned concepts during the interviews, without categorising them too much. So, it happens that this first column consists of 50 to 100 or more concepts deriving from the interviews. However, this is relevant and important in order to succeed in the methodology (Gioia, 2004). The 1st-order concepts are then generalised to 2nd-order themes, where similar concepts are compiled. Between the themes exists heterogeneity. This generalisation makes the amount of data more manageable. The 2nd-order themes are then further generalised into 3rd-order dimensions that cover the main themes recurring in the raw data. The data structure ensures that the raw data transforms into feasible, sensible data which represents the subjects of research and delivers an answer to the research question proposed at the beginning.

The study applied this data structuring method, with the Atlas.ti application as follows. All relevant pieces of text in the transcriptions were selected and turned into so-called 'quotations'. The quotations (1514 in total) are short notations of what is said, using the interviewees' wording, forming the 1st-order concepts. These short quotations were then generalised into 'codes'. Codes (367 in total) summarise the message of the quotations linked to them, forming the 2nd-order themes. These codes were then again generalised into 'code groups' (68 in total). Some code groups are derived from Meyer's dimensions, but also from possible cultural aspects that lay outside Meyer's dimensions. Moreover, some code groups covered the organisational aspects of the research company. The three columns together show where the data came from, it enabled transparency. Furthermore, structuring raw data this way enabled analysing

hundreds or thousands of concepts manageable, specified per research country: the Netherlands, the USA, and China.

4 Results

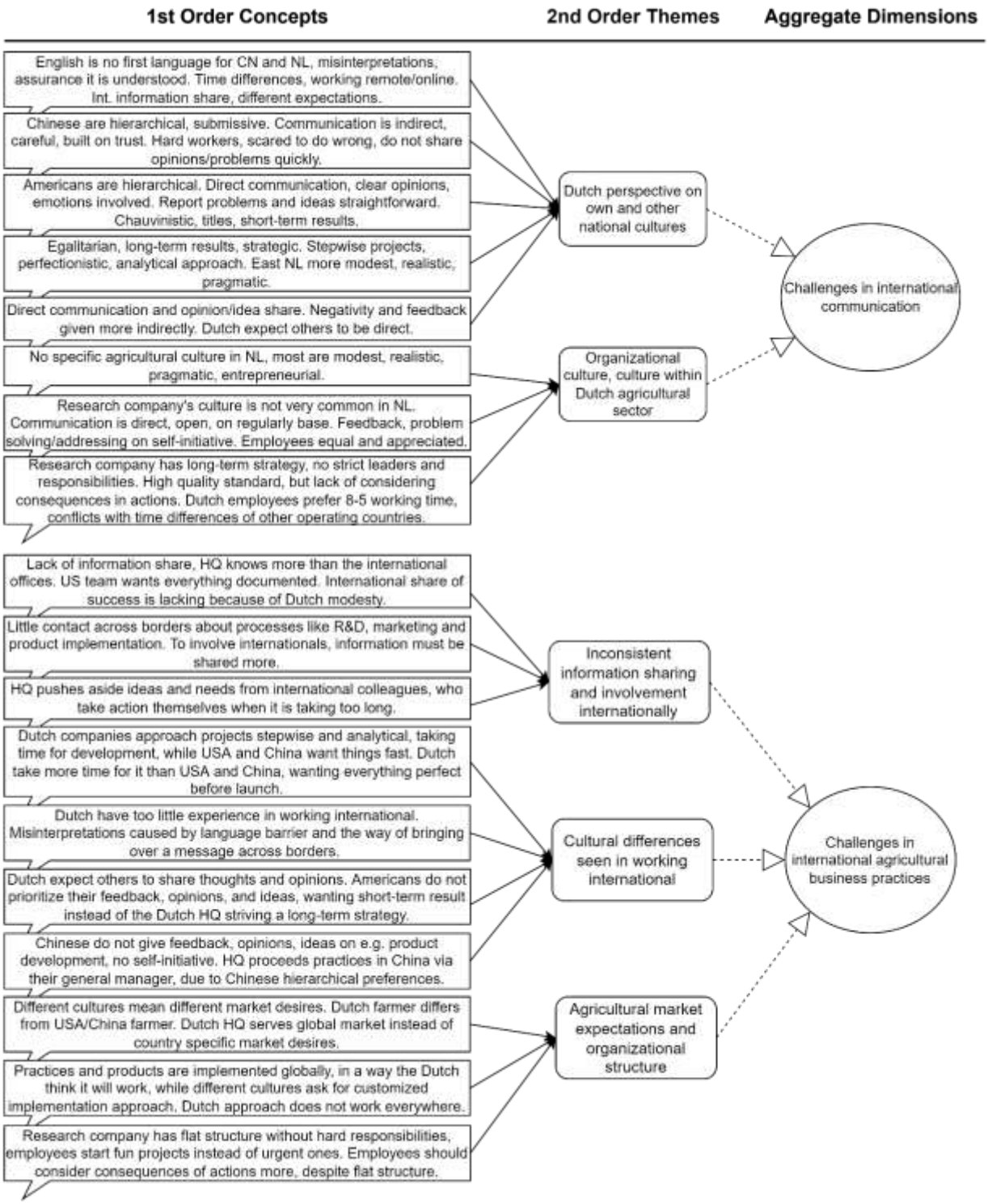
The research question: "How can cultural mental models explain challenges in communication and international practices in high-tech agribusiness?", regards two 'aggregate dimensions' (3rd-order themes): 'challenges in international communication' and 'challenges in international agricultural business practices'. These two dimensions have 2nd-order themes, all explained from the dataset. Paragraphs 4.1 and 4.2 elaborate on all themes found in the data structures (which can be found within 4.1), and how these interfere with the research question. A clear comparison is made between the three countries regarding the two different dimensions. Moreover, quotes and anecdotes of the participants give a clear illustration of how the 1st-order concepts have been established.

4.1 Cultural mental models related to challenges in international communication

The first aggregate dimension covers one part of the research question and resulted from two 2nd-order themes: 'perspective on own and other cultures' and 'organisational culture, culture within the national agricultural sector'. One could argue whether the first 2nd-order theme should be split up. Kedia et al. (2014) investigated the brain mechanism of social comparison. Literature review showed that 'human judgement is by nature comparative'. It is a cognitive process where social comparisons are used to describe oneself. In this study, this means that the participants have described their own culture partly by describing other cultures and partly by comparing them to their own culture, which is why this theme is not split up. The second 2nd-order theme is not split up, since the organisational culture has aspects that overlap with the agricultural culture.

As the headquarters of the research company is located in the Netherlands, the study results start with the Dutch perspectives and insights and then interlace the Chinese and American points of view to offer a more comprehensive story. Figure 2 (the Netherlands), Figure 3 (the USA), and Figure 4 (China) depic the data structure according to the three groups of participants.

Figure 2. Data structure of interviews with Dutch participants



4.1.1 Dutch, American, and Chinese perspective on own and other cultures

During the interviews the Dutch participants gave their opinions on the American and Chinese cultures, comparing them to the Dutch culture. Cultures already differ within the Netherlands: “The more

west you go, the more direct the Dutch, the more east your go, the more modest the Dutch". The majority of the interviewees underlined that the Dutch consider themselves entrepreneurial, direct in communication, and perfectionistic with an analytical approach. One of the participants noted: "I totally agree with the general opinion on the Dutch being extremely entrepreneurial, flying around the world and stuff". Similarly, interviewees commented that common Dutch companies are egalitarian in structure, communication is direct, and Dutch people are long-term oriented, seeking strategic goals. A Dutch employee who had lived in the USA for some years highlighted that the directness in communication is flattened by messages being personally loaded, and added: "I notice that when some things get personal, the Dutch find it more difficult to bring over, they sugar-coat it". On the same line, another participant mentioned: "Dutch people expect others to be direct, also when it is negatively loaded", while this is not always how the Dutch communicate themselves according to the international colleagues. For example, the American colleagues experience: "US side is pretty direct, it seems like we get the run-around from the Netherlands side, and what the actual answer is".

So, there are different perspectives on each other's culture and how this translates to daily communication within the organisation. For example, according to the Dutch, China has a hierarchical mindset, where employees are submissive to their superiors. One Dutch employee from technical support told a story of when he visited China a couple of years ago.

"I was there for a week or two, visiting multiple farms, meeting with Chinese colleagues. However, my credit card did not work. So, I could not pay my hotel costs for example. I apologised a lot to the people working in that hotel. After a week of puzzling about why the card did not work, I found out that it was my fault. The card was not activated yet. So, when I fixed the activation, I went to the hotel desk to pay for everything I should have paid for already. Eventually, the Chinese lady at the desk started apologising for my credit card not working for so long. Really weird because I knew it was only me to blame for the card not working that week. It got worse when a Chinese man approached the hotel desk. He was really angry, yelling at the desk lady for a couple of minutes. She was constantly apologising it seemed so, even the hotel manager came by and also began to shout at her. I was stunned. It made me really feel that the Chinese hierarchy consists of rich men in expensive suits, driving an expensive car, really overpowering the lower divisions of society. A real cultural difference with the Dutch mindset".

The Chinese participants agree on this difference: "Chinese companies are typically hierarchical, hierarchy is less typical for [research company]", a technical employee said. Another perspective from the Dutch participants toward the Chinese culture is indirect communication. Where Dutch employees shared their experiences: "Chinese sometimes say 'yes', but they actually mean 'no'", and "The Chinese follow

up orders of their general manager, rather than from the Dutch colleagues, that is just their culture". The Dutch appreciate the Chinese for being hard workers but believe that Chinese employees are scared to do wrong and do not raise alarms when problems occur. Chinese interviewees mentioned that "Acts overweigh words in China, it is what you do, not what you say that is important". Chinese people prefer to go the middle way, they are afraid to embarrass or insult others with too direct communication. An operations employee in China explained: "Chinese people say ok, ok, but that could create misunderstandings internationally". During the interview, the Chinese participants were asked to give their opinion and perspective on Dutch culture. Instead of directly addressing the Netherlands, the participants broaden it to: 'the Western culture'. "Western people think we are introverted, in the Western world they are free, with clear image and open communicating", "We do things differently, the Western way is spending a long time discussing before proceeding practice". Both the Dutch and Chinese have a certain image of each other's culture and way of communicating, these images are not always aligning with each other.

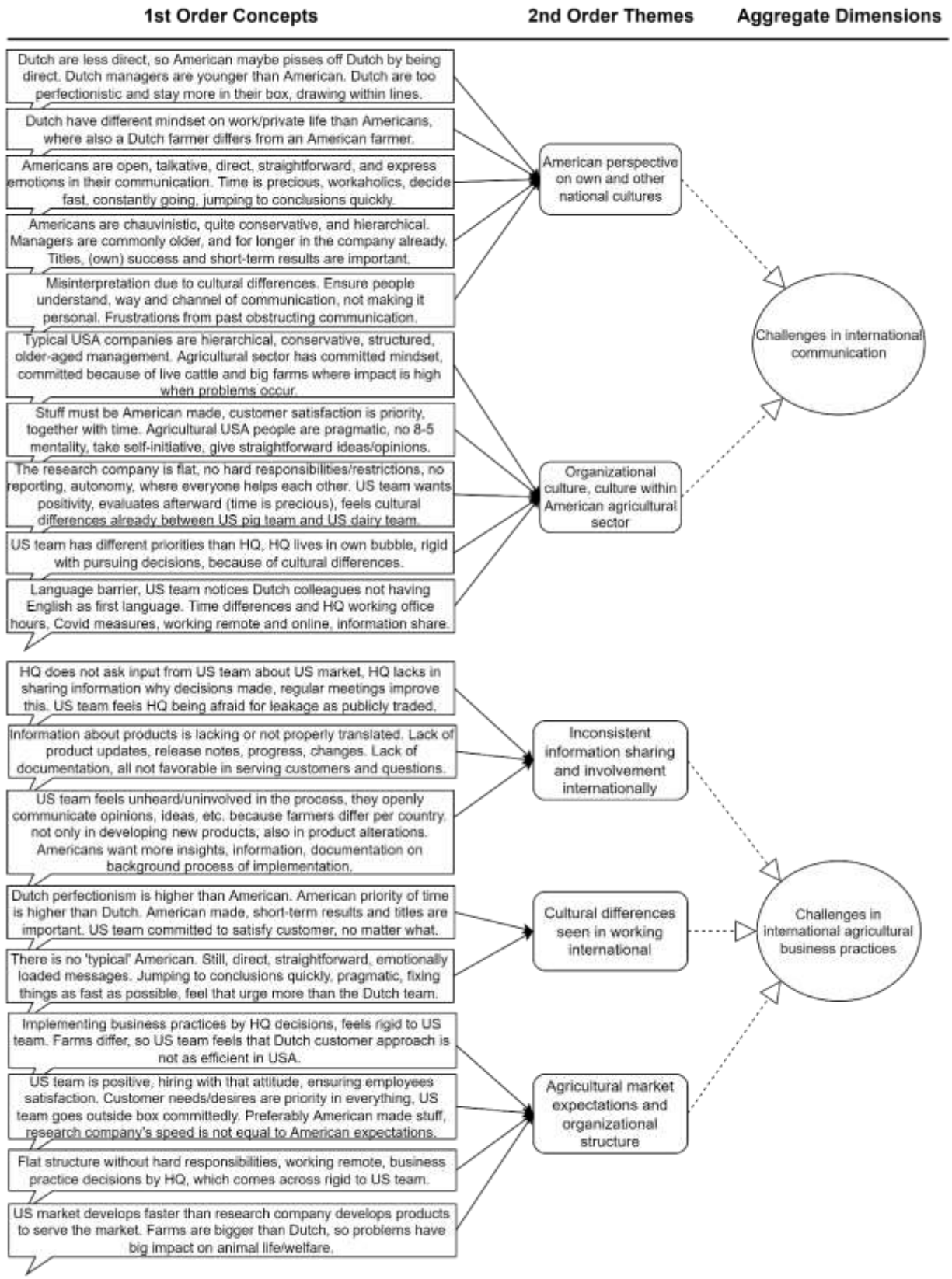
Figure 3. Data structure of interviews with Chinese participants

The Dutch participants also made comparisons with their American colleagues and their culture. Just like the Chinese culture, the American culture is hierarchical in mindset. According to a Dutch support employee: “America and China have hierarchy, make decisions with their superior, they want their green light before pursuing with business practices”. This statement is seen in the research company’s international structure: “[research company] is flat of structure, fine for the Dutch employees, but colleagues from China and the USA expect hierarchy”, A Dutch salesman told. Also, multiple Dutch employees told that “American wants to be the best, giving immediate answers, he feels less and inferior when he can't give those answers”, and this need for success causes impatience in the work atmosphere. Dutch people see Americans as chauvinistic, proud of their own country and successes, the Dutch employee who lived in the USA gave an example: “Dutch are less chauvinistic than the US, like in games where Americans have hand on hard during the national anthem”. The American participants mentioned multiple times being proud Americans. Dutch and American people differ in communication. The Dutch opine the Americans are more direct than both the Dutch and Chinese people, causing misinterpretations: “Americans are more direct in negativity and disagreement, which is interpreted wrongly by the Dutch team”, which is confirmed by multiple American and Dutch participants. The way of communicating is direct, whereas Americans tend to be overly emotional according to the Dutch employees: “Americans exaggerate everyday problems, have short uses and address things excessively”. There are multiple examples and experiences between the Dutch and American cultures regarding communication and interpretation, and how expectations differ from each other, also within companies.

The Dutch participants mention multiple practicalities that were the cause of some misinterpretations regarding international communication. First, the time differences. As one of the technical operators noted: “The time differences, some people are just awake, some already worked a whole day, that must be taken into account”. This complication is also acknowledged by American and Chinese employees. “Every night a support guy is supposed to be available for problem-solving, but due to time difference with America this is not always the case, causing stress”, and “We can’t find the Dutch office on weekends, but in China, we must be 7 days 24/7 available”. Second, is the language barrier. The main language for communicating internationally is English, despite this is not the first language of both the Dutch and Chinese employees. The general manager of the USA team stated that “If English is not your first language, you assume it reads the way it should, but in fact, it is interpreted differently”. The Chinese general manager indeed underlined that “Language issues complicate Chinese employees forwarding communication about Chinese demand and thinking to other teams”. Third, working remotely has affected the overall communication and information shared internationally. Due to the Covid-

pandemic, the Dutch employees had to work from home almost entirely, while working remotely is a daily routine for the American and Chinese employees. “The Dutch do not always understand the Americans working remote all the time”, still, the Dutch technical operations manager appointed: “I have always pronounced how much I respect them, always working remotely”. Lastly, the international communication of certain business information is lacking. According to participants, multiple situations are causing this flaw. As the Dutch salesman explained: “The Dutch office strives for equal information availability within the global team, which is not the case currently”, subsequently, a Chinese technical operator expressed the feeling: “The Dutch team likes things closed off, withholding information which should be shared”. Moreover, among the American interviewees, the feeling arises that “Headquarters hid information which I wanted to be shared” and “Headquarters is afraid of information leakage because of publicly trade”, according to an American marketing employee. In conclusion, multiple practical incidentals besides cultural differences are related to overall international communication.

Figure 4. Data structure of interviews with American participants



During the interviews, many statements were made about how national cultural differences and practical complications could be challenging for communicating internationally. However, besides the national culture, participants not only discussed the fact that the research company had its own organisational culture, but also that the agricultural sector is rather different from other business sectors in the world, with different priorities, high impact on and of great importance to the globe, and the mindset of people working in it. Both the organisational and agricultural sector culture were found to be associated with communication internationally.

4.1.2 Culture in the organisation and agricultural sector

The organisational culture of the research company is built from the Dutch culture because the headquarters is located in the Netherlands. Dutch participants in this study spoke about the norms and values within the organisation and what type of people are a great fit for that culture.

Dutch participants described the organisational culture as 'not very common' since "Everyone communicates very openly, asking questions when it is needed", a Dutch technical operator stated. Participants noted that in the organisation there are regular meetings, also with the international colleagues where people give feedback on each other and address problems, all on self-initiative. Within the organisation, people strive for the best, as the technical operation manager explained: "Everyone goes for that 8 or 10, no 6 or 7". The majority of the interviewees also underlined that the organisation gives space to make mistakes, in order to learn from it. Employees must dare to say what they think, there is a lot of autonomy, without actual leaders or manager roles. So, the people within the research company should have some personal characteristics and preferences that fit well into the organisational culture, in order to cope with the flat structure. For instance, one Dutch employee who has been working for a long time at the research company explained: "If [research company] must rehire everyone, not everyone would survive to stay, which sounds rough". Hence, it seems that within the research company, a certain kind of people is needed in order to let the organisation work well. The abilities to communicate openly, address problems and ideas on self-initiative, be perfectionistic, and work autonomously without needing the permission of superiors. The downside of this autonomous way of working is: "People decide themselves where they work on, so not always on the urgent or important projects", and "[Research company] encourages going outside lines, is nice, but it causes lack of focus". Both cases are seen and mentioned by Dutch employees as disadvantageous.

The downsides of this organisational culture are also seen in the American participants' opinions. Within the USA team, there is a flat structure, no hard responsibilities, and an open communication flow, which is not common when compared to a more typical company in the USA. The American general

manager has a certain feeling: “It seems to be a big challenge to prioritise, the USA team has different priorities from headquarters, there is a lack of focus and responsibilities”. The biggest organisational cultural difference between the Dutch team and the American team is time. Americans put time in the first place, like American technical employees: “Something wrong? Get it fixed, not pointing fingers or saying someone did wrong, after it is fixed we do autopsy”, whereas the Dutch team puts quality the first place in most cases like a Dutch technical employee opined: “The drive for high quality is globally known, something imperfect will be improved, despite the time it may take”. The organisational culture within the American team already differs: “Pig team members are relaxed, defer to the directive. Dairy team members very independent, manager sits back, team meetings for example, are ran differently”, an American marketeer told. The Dutch participants describe the organisational culture as open, free-flowing, autonomous employees. American colleagues are direct in their communication about problems, ideas, and other issues. They report to others easily about problems, ideas, and other issues. Americans are eager to be the best and find it important to be informed by headquarters about everything and ensure that headquarters will be informed about everything happening in the USA. Still, the American team feels that headquarters lives “in their own bubble”, where decisions are made without involving or informing the American colleagues, causing frustration in the American team. So, most aspects of the organisational culture as the Dutch participants describe it are also seen in the American perspective on it. The main difference lies in the American colleagues’ demand for structure, responsibilities, and open involvement in communication internationally.

Similar to the American colleagues, the Chinese participants also put time in the first place. The Dutch participants noted that the Chinese team acts individually sometimes to spare time, a pragmatic approach to solving problems, and other daily business practices. The norms and values within the Chinese team fit mostly to the overall organisational culture as described by the Dutch participants. One Chinese operations employee mentioned: “I like the Dutch thinking, [Research company] has open, free communication, if problems occur, just say directly so we can solve this”. There are regular international meetings to discuss practicalities and share issues that occurred. Still, a Chinese technical employee explained: “[Research company] is Dutch, with a certain way of doing business, as a European company very different from traditional Chinese companies, because there are not many leaders for example”. Typical Chinese companies are hierarchically structured, where employees are submissive to their superiors. Within the Chinese team, this hierarchical mindset comes slightly forward: “We discuss with the team first, the general manager will make the final decision”, moreover, the general manager told: “I do not express my opinion first, that will influence free communication, I only express when we struggle

in deciding". So, it is in the Chinese employees' nature to follow orders and think hierarchically. Between the Dutch and Chinese teams, there is trust built, which is important to the Chinese team. Still, communicating with Dutch headquarters is hard because of the language issues, and indirect nature of the Chinese colleagues, as explained by a Chinese marketeer: "Sometimes we cannot convince Dutch team because of cultural differences, then we explain again". Time is the priority, so many issues are dealt with within the Chinese team only. "This freedom is necessary, afterwards we decide with HQ whether it was the best approach or not", the Chinese general manager clarified. So, the organizational culture within the Chinese team is slightly hierarchical, but in other aspects different from the culture within typical Chinese companies.

Next to the organisational culture, the culture of the agricultural sector was discussed several times by multiple participants. One of the Dutch technical operators, for example, said: "I think it is in the culture of this region, not particular the culture of the agricultural sector", while another Dutch technical operator stated: "Most people have origin in agriculture or livestock, with a certain image to the world". In this study, we take the Dutch perspectives as a base, but from the interviews, no specific characteristics belonging to the Dutch agricultural sector are mentioned. The research company is located in a region known as modest, pragmatic, realistic, and entrepreneurial. Nevertheless, both the American and Chinese participants gave their insights into their national agricultural culture. American and Chinese farmers are different from the Dutch ones, just like the agricultural markets differ per country, this difference is appointed multiple times during the interviews. American and Chinese participants pointed out that "Holland farms are nothing compared to US farms", and that "US customers are different from Chinese customers and Dutch customers, causing clashes", or also that "Sometimes what works for Europe or America does not fit for China market". Chinese and American colleagues say their dedication to work and solving problems when they occur is higher than in the Netherlands. Due to the bigger farm sizes, the impact of problems is much higher than on smaller, Dutch farms. Next to the dedication, American and Chinese colleagues have no eight to five mentality. Animals need to be fed, so when a farmer encounters a problem that needs to be fixed, they must have the opportunity to contact someone to support them. A typical American farmer shares their ideas and opinions on things. Also, the chauvinistic side of national American culture is involved: "National standpoint, agriculture is conservative, things need to be American made", the American general manager told. Employees that serve the American farmer have a direct customer approach. The Chinese agricultural mindset has similarities to the American one. Chinese people opine that the agricultural mindset should not be eight to five, but 24/7. Also, speed is important, as a Chinese technical employee stated: "I'm Chinese, they want to go fast because, in the animal industry,

animals must be fed". Despite the big Chinese land surface, only 30% is suitable for agriculture: "Chinese farmers want efficient production levels because the Chinese population must eat you know", the Chinese general manager explained. The typical Chinese farmer is eager for high-tech solutions. Though, the products must be simple, useful, and helpful. There are multiple similarities between American and Chinese agriculture. Not much is said about Dutch agriculture. The biggest differences are triggered by and derived from the differences in farm size.

4.2 Cultural mental models related to challenges in international agricultural business practices

The second aggregate dimension covers the other part of the research question and derives from three 2nd-order themes: "inconsistent information sharing and involvement internationally", "cultural differences seen in working international", and "Agricultural market expectations and organisational structure". As the headquarters of the research company is located in the Netherlands, the study results start with the Dutch perspectives and insights and then interlace the Chinese and American points of view to offer a more comprehensive story. Figure 3, Figure 4, and Figure 5 depic the data structure according to the three groups of participants.

4.2.1 Cultural differences seen in working internationally

During the interviews, the Dutch participants addressed multiple experiences deriving from the different cultures between the Netherlands, China, and the USA. These experiences are not particularly focused on communication, but more on international agricultural business practices in general. Some of these cultural differences cause challenges in these business practices. Given that the research company is a flat structure without a hierarchy and leaders that are controlling directions, multiple Chinese participants mentioned the peculiarity of this structure: "[research company] is flat, typical Chinese company has different levels, low level cannot cross higher level", and "China and other Eastern countries have no flat organisation, different levels which may not be crossed". So, there is already a difference in how common Chinese employees do their work in a certain work atmosphere, which is different from the way of working in common Dutch companies and the research company. As mentioned above, Dutch companies and their employees tend to approach projects stepwise, with extensive analyses and perfectionism. While China and the USA want practices and projects to proceed quickly, not taking too much time for it. As one technical operator from the American team stated: "Dutch team wants perfect before letting go, it is a cultural difference". This difference is also seen with the Chinese team: "We do things differently, Western way is spending a long time discussing before proceeding practice, everything must be perfect". The way of working differs per country.

The American team states there is no typical American personality. However, there are given characteristics that most Americans possess: being straightforward in comings and goings. A difference with most Dutch people is that Americans feel the urge of doing things quickly, especially in agriculture. As the American general manager illustrated: “Americans are like boom, making decisions, this is what we do, and we run off”. Americans feel this urge more than their Dutch colleagues, probably because they get directly involved when problems at farm installations occur. The Dutch colleagues are not directly in touch with farmers as the Americans and Chinese colleagues do. As one American technical support employee explained: “Biggest hiccup of stress when a change isn't great for the farmer, we upset him and must deal with it”. This difference in drive and dedication causes different expectations and priorities in the global business practices the research company has. As said earlier, Dutch people expect others to share their thoughts and ideas. The Dutch employees explain that “Putting effort in calling the Chinese, the more you talk with them, the easier they share things, the more they trust you”. A Dutch technical support employee mentioned that “[technical support manager] triggers Chinese to share problems and ideas, contact every Thursday”. Nevertheless, the Dutch headquarters would like to have more responses from the Chinese colleagues. Because, as the Dutch technical support manager explained: “When I want something done in China, I must convince the general manager of it, he then ensures it happens, this is due to cultural differences”. The Chinese participants do mention their need for customised practices in China because farmers there differ from the Dutch ones. Still, the Chinese general manager implied a challenge with that: “We encourage customers to express ideas but they don't speak to you openly like an old friend, relation must be built first”, “There should be more communication between China and Groenlo team because we understand Chinese customers and concerns, but sometimes we cannot convince Dutch team because of cultural differences, then we explain again”. From the Dutch side, it is said that the employees have too little experience of working internationally, causing misinterpretations and clashes. The language barrier and the way of communicating are the two main reasons why misinterpretations in business practices occur.

Besides, there is also the challenge of the agricultural markets being different because of the different cultures between the Netherlands and China. The general manager of China stated: “Dutch suppose all markets will be the same, however, this is not the case”. There is a challenging gap between the desires of country-specific markets and the global strategy of the research company. Another cultural difference that affects business practices is the way of working within the research company, as the general manager of China said: “[research company] is Dutch, European, with a certain way of doing business”. The same comparison is made by the American participants: “US farms are larger, aggressive,

demanding, US team is in different time zone and language from Dutch HQ". In short, different cultures result in different customer demands, expectations, and therefore different preferred approaches. Moreover, different cultures imply employees have different demands, expectations, and ways of working. Both affect global agricultural business practices.

4.2.2 Inconsistent information sharing and involvement internationally

Employees are having expectations, demands, and ways of working, which differ per country. Participants of all three countries addressed a major topic going on in the research company: information share of and involvement in the organisation's business practices. The Dutch colleagues acknowledge a lack of information share: "We strive for equal information availability in the Global sales team, which isn't the case currently". This results in the Dutch headquarters possessing more information than the international offices, and the international offices raise alarms wanting more information about R&D, marketing, and product implementation for example. As one technical support employee from the USA explained: "We've had several issues with databases causing trouble because we don't know enough. US team needs more information about products and its development process". The American colleagues want more information about why certain decisions are made, but there should also be more documentation shared about products, updates, progress, and changes. Because: "More customers with advanced questions we don't have information on", and "I'm frustrated about the rigidity of things happening from HQ, frustration is a big challenge". Also, one of the Chinese employees illustrated: "You cannot dilute something if no clear information is delivered, but if you proceed without information, then you also leap over the development team". Not only practical information but also information about successes and achievements are not shared with the international colleagues properly. One of the Dutch support employees explained: "Successes are mainly shared within the Dutch team, not always with the international colleagues". Information share is therefore not only about practicalities and how practices should be done internationally, it is also about sharing success and accomplishments, to keep up the positive spirit within the global team.

Dutch colleagues also address the dilemma of whether to involve the international colleagues in certain projects, processes, etc., or not: "It's not necessary to look in all projects, but it's about being 1 Nedap where everyone can share success and problems, 1 club". However, a Dutch salesman explained: "You can't be involved in all processes begin to end, everyone doing their pee on it, then products will never launch". Both American and Chinese colleagues mentioned that sometimes, ideas and needs from the international offices are ignored. Within the American team, the following situation emerged multiple times: "Product management or development needs more insights from application team out on farms.

However, if we bring up something it goes into the grey zone, who makes sure it gets taken care of?". The Chinese team experiences similar situations, where according to the general manager of the Chinese office "Within [research company] we are the bridge between headquarters and China with some Western philosophy. Still, learning from the Chinese market is not always there, the conditions/situations/experiences". On the one side, international colleagues feel uninvolved and unheard when it comes to the research company's business practices. On the other side, the Dutch colleagues are afraid that too much involvement will delay everyday processes and decisions.

4.2.3 Agricultural market expectations and organisational structure

Within the interview answers, it became clear that challenges in these international business practices were also related to the agricultural sector and market the research company operates in, as well as the organisational structure. From the Dutch headquarters' standpoint, the global market is served, having a global strategy. The Dutch sales participant stated: "Our Global business partners are directed via our global strategy, where the global strategy is the priority, not the local strategy". However, the challenge of this strategy is explained by one of the Dutch support employees: "The biggest challenge developing products that work globally, something profitable for Dutch farms isn't per se working abroad also". So, the agricultural business practices are developed and implemented globally, while it is not always meeting country-specific preferences. Both the American and Chinese agricultural market develops and serves the customer faster than the research company can. As the general manager of the Chinese team mentioned: "Chinese companies are fast learners. Copying products easily, quickly, for fewer costs. The market is very competitive". Also, one of the American employees told: "US customers are different from Chinese customers and Dutch customers, causing clashes". Dutch farms are smaller in size, whereas the impact on animals is higher at the bigger American and Chinese farms when problems occur. This results in expectations from international customers and employees differing from what Dutch headquarters currently offers. Starting with an American support employee saying: "US customers don't understand aspect of global market serving. We say Nedap is a Holland company, but also global, which scares US customers because software isn't localised". The American employees also experience a cultural difference: "I noticed people not go sideways their box as US people do". This comes back to the rate of dedication the international colleagues have, in comparison to the Dutch. American farmers from a national standpoint are 'conservative, things need to be American made'. These American expectations of both the American employees and customers are different from what the Dutch headquarters carries out. For the Chinese team and customers, the expectations also differ from what the Dutch team offers. Regarding product development, the general manager implies: "The problem is that potential is ideal in

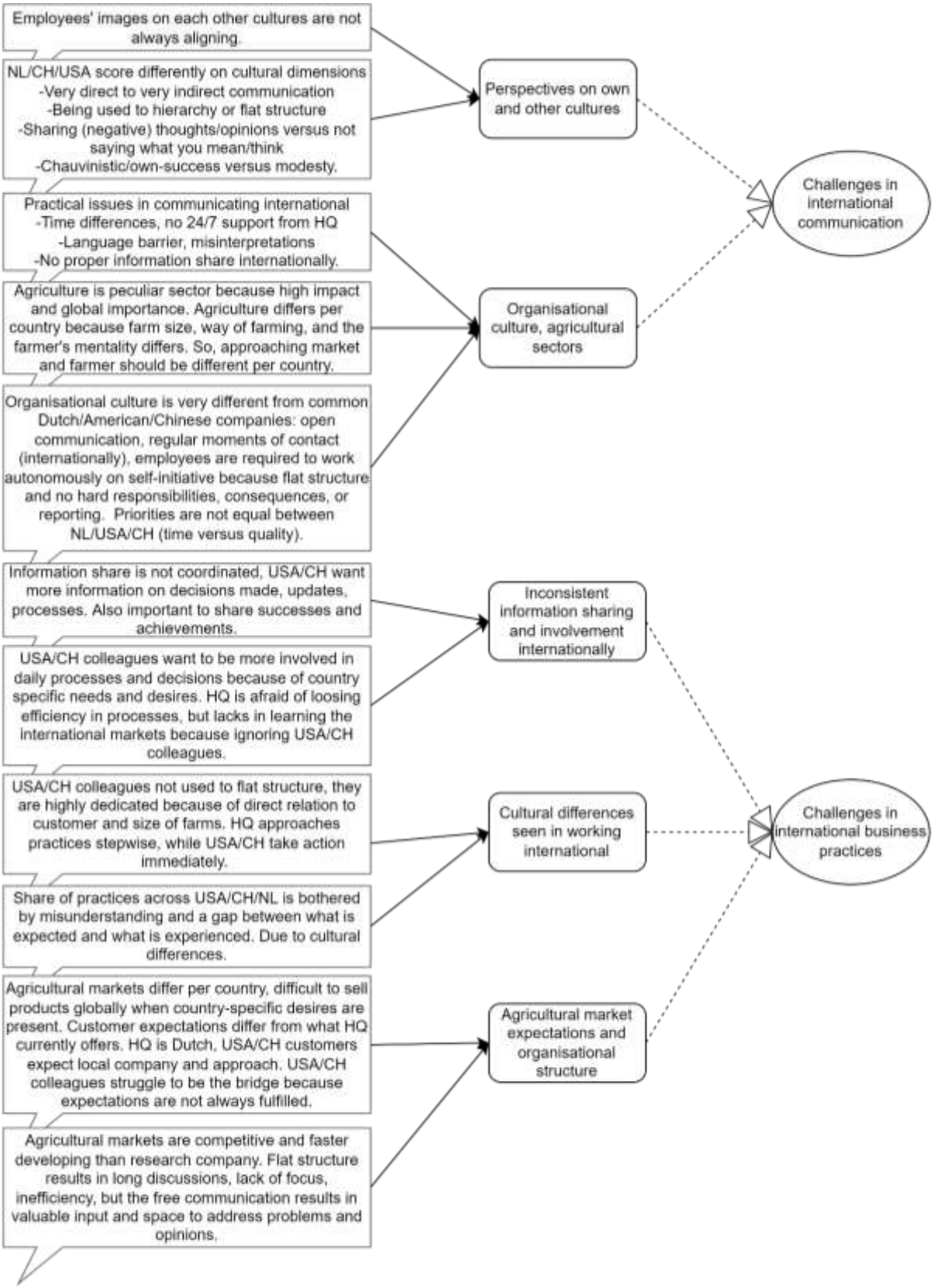
their (the Dutch) customer mind, Chinese customer want simple, useful, helpful products. However, serving all different countries, so products and systems combined and more comprehensive but at the same time more difficult to use and not bought for high tech". Besides the product itself, both Chinese and American farmers expect a next-day delivery of products. Time is the priority, animals must be fed, and impact is high when products are delayed for example. The general manager of the American team gave an example of American customer expectations when someone buys a car.

"If I want to buy a car I just go to the car lot. It's where they have 80 to 100 different varieties I can choose from, so you know the American mentality is: I'm gonna get it today. And so that that carries through with everything. Whereas I know, for our Dutch colleagues, if they want to buy a car, you order the car and then you wait until the car's delivered. So, it's this instant gratification, and I think that's even now it's like if we want something done. You know, if there's a technical issue we're like we'll just fix it".

The majority of the participants also underlined that the organisational structure of the research company plays an important role in international agricultural business practices. The Dutch participants described the organisational structure as flat, without hard responsibilities. This image is confirmed by the American and Chinese participants: "The hierarchical structure is not present within [research company] and the Chinese team". Where an American operator already discusses advantages and disadvantages: "Both good and bad for [research company] being flat". One of the downsides of this flat structure is explained by a Dutch finance employee: "The lack of structure and people decide themselves where they work on, so not always on the urgent/important projects". There is lack of focus sometimes, and urgent business practices are not always proceeded at first. The Chinese general manager mentioned another aspect that could be counted as negative regarding the flat structure: "Reaching for agreement, sometimes there is not, which is possible because of open discussion with team". A positive influence of having no strict structure is open and free communication. Everyone is allowed to share ideas that are taken seriously, according to the norms and values of the research company. An American sales employee felt welcome when she started working at the research company: "Everybody is helpful, every question can be asked, open books, quick direction to others, I felt very received last year". Similar is the opinion of an American technical operator: "You can reach to whoever you need to talk to". Most business practices are decided within headquarters, which creates frustrations for the American team: "Rigidity of HQ, having own culture and bubble with everybody there, the Netherlands tells us things in an alienating way". The Chinese colleagues also work remotely, they do not meet with each other in person. As a Chinese technical employee described: "We only have teams meeting with Dutch office, inside China team no meetings, we communicate via WeChat or telephone".

In total, the challenges of international practices in agribusiness are caused by multiple factors, both cultural and practical. It comes down to a set of expectations that each country, each employee, each department, and each customer can have, and how they relate to each other. From there, the study results show some gaps between these expectations that cause challenges in the overall agricultural business practices. To give an overview, the figure on the next page combines the three data structure models from before, capturing the main topics the differences are found and how this is related to the challenges mentioned during the interviews.

Figure 5. Summarising overview of data structure models NL/USA/CH



5 Discussion

The goal of this abductive research was to explore how cultural mental models may explain challenges in international high-tech practices in agribusiness. In particular, the research aimed to investigate the challenges experiencing when communicating and performing business practices internationally, focusing on three countries, namely the Netherlands, China, and the USA. Abductive research enabled openness to broader insights than the original scoped problem, contributing to existing literature. Doing so, we contributed to the literature on international (agri)business practice in three ways: extending the existing dimensions and interpretation of Meyer's Culture Map, establishing the agricultural culture, and explaining challenges in cSommunication and business practices internationally.

Extending Meyer's Culture Map

Firstly, Meyer's Culture Map (2014) has been useful for this study in terms of bringing some quantitative measurements into a qualitative study. When interpreting the study results abductively, other cultures besides the national culture can be mapped according to the different dimensions. Meyer already has tools online where organisations, teams, or a single person can map their culture. However, this is not scientifically substantiated yet. This study extents to Meyer's Culture Map because results show that there is a certain culture within the agricultural sector, separate from the national and organisational culture. It is assumable that other sectors have a culture different from the agricultural one. Meyer's dimensions were certified in the study's cultural mental models. However, the study results showed additional cultural aspects that explain communicational challenges and practical challenges when operating in international agribusiness. Hence, the dimensions of the Culture Map did not explain all occurring challenges in this study and did not interfere with business practices, but only on communicational aspects in organisations.

As Meyer stated (p.15, 2014): "The point here is that, when examining how people from different cultures relate to one another, what matters is not the absolute position of either culture on the scale but rather the relative position of the two cultures. It is this relative positioning that determines how people view one another". Likewise, this study interpreted the differences and challenges when cultures from the USA, the Netherlands, and China were compared to each other. The actual meaning of culture lies in when it is compared to others. This study would not have been as well-grounded when it would only focus on the Dutch cultural mental models for example.

Agricultural culture

We implemented a well-established cultural framework (i.e., Meyer's Culture Map) in the under-research international agribusiness sector to explore how cultural differences can influence this sector. Current literature investigated cultural frameworks in other sectors such as schools (Detert et al., 2001), construction (Igo & Skitmore, 2006), engineering (Brockmann & Birkholz, 2006), neglecting the agricultural sector. Hence, the new insights into the agricultural culture contribute to existing literature. It was expected that the agricultural sector has its own culture, despite the lack of confirmation in literature. The study results contributed to describing this culture and results have shown that there are country-specific preferences in agriculture. However, these do not always derive from personality or national culture. Most preferences and characteristics are derived from the agricultural market: competitors, customer demand, customer approach, the common way of farming, etc. Hence, our expectation is not completely fulfilled. An explanation for this could be found in Sporleder and Boland (2011), where economic characteristics of the agrifood supply chain and its exclusivity are described. From there, one could think that the exclusivity of the agricultural supply chain is because of its unique business practices and processes, and therefore the people working in it should have certain personal characteristics that fit well. However, one could also think reversed, where the people in a certain country have characteristics deriving from the national culture that influence the way processes and practices are done in agriculture, resulting in people having certain characteristics that fit well in the sector.

The study was originally focused on the national and agricultural cultures. When data was analysed, an additional form of culture occurred, organisational culture. There is literature about the organisational culture which is not discussed in this study. Sueldo and Streimikiene (2019) investigated what tools and features are vital for creating a strong organisational culture and how this culture can or must change over time. Warrick (2017) explained how organisational cultures are created, what types there are, how to implement them, and more importantly: the need of understanding that national cultures influence and determine whether a certain organisational culture works or not. Given this, our study results contribute in a way that the national culture is likely to determine the success of the organisational culture of companies in agribusiness, and, it would be likely that the organisational culture of companies in agribusiness is particular due to the peculiarity of the sector itself. Hence, the data results of this study imply a link to the current literature available, resulting in a relationship between national culture, agricultural culture, and organisational culture.

Challenges in international communication and business practices

Meyer's Culture Map is mainly focused on organisational communication. Meyer's dimensions are not enough in explaining all challenges described in this study regarding organisational communication and practices. Before conducting the study, most causes of challenges in international communication were expected to be framed in a cultural sense. Existing literature already stated that there are also other, non-cultural, factors causing these challenges (Staff et al., 2014). The use of wording, the environment in which a message is sent or received, (the functioning of) the channel with which a message is sent, the current mood of the sender or receiver, and the effort that is needed to communicate are all non-cultural factors that influence the quality of communication. This study contributes to the existing literature in confirming all these non-cultural factors and providing insights into how (non-)cultural factors interfere with daily (agricultural) business practices. The study results lack the specification of what type of communication is focused on, and what types of challenges occur most. Still, the results show that international communication comes with many challenges, Lewkowicz et al. (2008) state that this may relate to misinterpretations throughout the whole organisation. Some of the semiotic layers have linkage with the study results. The Empirics layer is based on the human patterns of messaging others, which is strongly related with the cultures assessed in this study. Behaviour and communicational habits explain misinterpretations. The Semantic layer is also related to the study results. English is important to communicate across the globe, but people's level in this language is not equal, causing misunderstandings. A third layer, Pragmatic layer, where people behave and communicate with certain glasses on because of earlier frustrations or conflicts of interests between the sender and receiver, causing misinterpretations. The most related layer is the Social norms layer, referring to different cultures causing different meanings e.g. the same non-verbal communication. Our study results matches with this layer thoroughly.

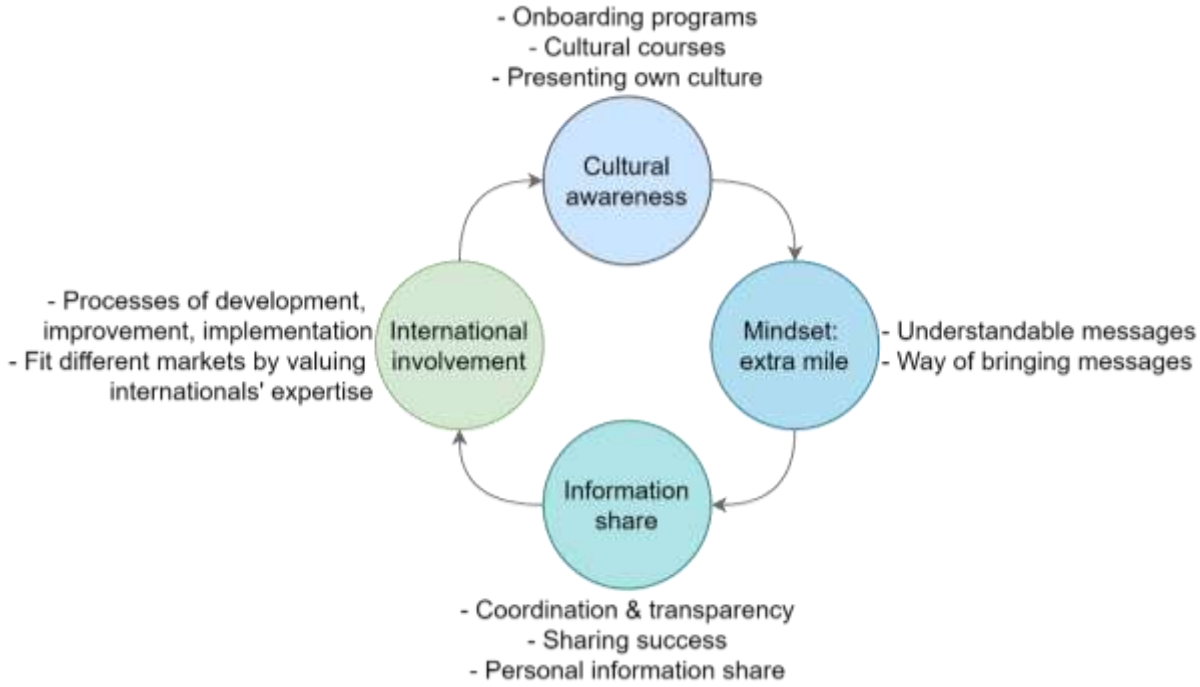
Lastly, the study results elaborate on international business practices. The theory about cultures affecting business practices is there. Our study results extend these theories in describing the challenges and how this relates to national, organisational, or agricultural culture. Forstlechner & Lettice (2007) stated that there are different regions with different cultures. Given this, different ways of approaching and treating people in business are needed, especially in the share of information within an internationally operating company. Our study results are complementary to the results of Forstlechner and Lettice (2007). The data structure models show how cultures differ and how these differences explain certain business challenges. However, our study results show that it is not only found in cultural aspects but also in the different expectations employees across the globe have about the same practice or collaboration. For example, as Forstlechner & Lettice (2007) described the share of information. Within the research

company, it appeared that the different international teams have different ideas on what information should be shared or not. The difference with Forstlechner & Lettice (2007) is that our study results indicate this expectation difference due to the job someone fulfills, plus the relationship and interaction headquarters has with the international teams. So, culture is one thing, but it is company and sector dependent on what factors influence business practices.

5.1 Practical implications

Besides the theoretical contributions, this thesis also has practical implications, since organisations like the research company have the possibility of implementing insights and/or results from this study, to achieve a stronger global collaboration. It is important to address possibilities upon which organisations can take action. The observations and results of this study and the researcher's experiences within and outside the research company, resulted into the following four pillars as illustrated in Figure 6.

Figure 6. Pillars in coping challenges in international communication and (agri)business practices



Firstly, it is important to start with the creation of cultural awareness within the organisation. The study results imply that there are differences between national cultures, but also between the organisational and agricultural cultures. Given this, it would be useful that organisations could promote intercultural awareness seminars or workshops, dedicated to all employees, and especially to those who are more likely to interact with international. Kazi (2015) stated that as information about cultures increases, the cultural awareness in the cross-cultural organisation should increase. If employees have the possibilities to know each other's cultural characteristics, it would be easier for them to act appropriately,

resulting in a better business collaboration globally. Creating cultural awareness could also be done through an onboarding programme, in particular for new employees. In all cases, organisations could hand out certificates or diplomas based on the employee's degree in cultural knowledge. In line with this attention to cultivating cultural awareness, regular webinars or meetings where international colleagues present their culture and their way of working to others could help in understanding and accepting cultural differences.

Secondly, besides learning about other cultures, it is crucial that employees go an extra mile when communicating across national borders. Considering that messages can have different meanings and can be misunderstood, and that cultures have different (sometimes clashing) ways of communicating, pondering on whether you achieved what you wanted to achieve could be a good attitude to nurture international environments and business.

Thirdly, with cultural awareness lies the overall international communication within the organisation, but also communication from the organisation towards customers and external business partners. Expectations regarding this subject differ between the different countries, creating the importance of knowing all expectations and to what extent they are fulfilled. It is useful for organisations to plan regular moments of contact with internationals. In this way, people can get to know each other, get used to working with each other, and talk with each other also about non-work related subjects. Given that, research has shown that successful teams communicate informally and talk about private matters more often than less successful teams (Hermansson & Larsson, 2019), this tactic could significantly improve the team and organisational effectiveness and efficiency. Transparent and informal communication brings openness and participation (Men, 2014), which enables access to new knowledge, information-share, and a trustworthy work atmosphere. The overall information share across national borders is lacking. International teams receive less information from headquarters than they expect to receive. The research company should build a structure, in consultation with the international teams, to ensure the flow of information is coordinated which improves the overall international communication. Expectations regarding information share will then be fulfilled properly. Therefore, it is important that organisations keep this running where everyone is allowed to share thoughts and opinions, in order to gain new insights and different perspectives, and closer cooperation globally.

Fourthly, it is important for an organisation to share successes and positivity throughout the whole organisation. Currently, this is not always the case within the research company. Successes are mainly shared within headquarters, but not always with the international teams. However, multiple participants

addressed that positivity throughout the whole organisation results in higher work motivation, higher job satisfaction, and a closer team spirit across national borders.

Lastly, concerning the business practices, the biggest improvement lies in the involvement of international colleagues in organisational processes. The agricultural culture differs per country, and, consequently, farmers' attitudes and behaviours, as well as the agricultural market, also differ. Organisations with international branches should value the expertise of their international colleagues since they have greater knowledge of the specific market needs and developments than the employees working at headquarters. The international colleagues could have direct contact with farmers and know therefore what is important to them. Hence, international colleagues could give presentations on how their market is structured, what challenges they cope with, and what opportunities they see regarding the market demand. By involving the international colleagues more in the processes of product development, improvement, and implementation, the products of organisations may then fit the country-specific demands better.

It is recommended to implement the four-pillar-cycle in organisations like the research company. A cycle, because the pillars form a continuous process relating to the overall business practices. Organisations can rely on this cycle when new employees start, when business operations start in a new country, with a new culture to discover and to learn about.

6 Limitations & future research

Although this study provides several new insights and contributions to the topic of cultural mental models and international high-tech agribusiness, it also has its limitations which should be considered in future research.

Firstly, the sample selection for this study influenced the validity of the results. Despite the predetermined characteristics and specifications of the three countries, the sample pool was quite broad because, eventually, almost every employee works within or with people from Technical Operations or Sales Operations. Consequently, if, on the one hand, this has allowed the gathering of a rather big set of data, which fully answers the research question, on the other hand, the focus of the findings was dispersed. Hence, future research could consider funneling down and/or restricting the sample selection through more specific criteria.

Secondly, for practical reasons, interviews with the Dutch, Chinese, and American participants were conducted in random order. Consequently, the point of data saturation was probably earlier reached than noticed, resulting in a larger set of data than expected, which is not damaging the study's validity because of the abductive approach. Again, specified research proposals and predetermined conditions will result in more specified data results. Future research could focus on the 2nd-order themes in this study, with more study participants, in order to specify the study as a whole with the possibility to approach the research more inductively or deductively.

Thirdly, while conducting the interviews, it was noticed that the Chinese participants could not always express everything they think about, due to the language barrier. The interviews with Chinese participants were conducted in English, which is not their first language. Interviews with Dutch participants were in Dutch, the Americans were interviewed in English, and both groups answered questions in their native language. This may have caused the Chinese not to be able to fully explain what they mean, what they think, and what they would like to tell. So, this affects the reliability of the data deriving from the Chinese interview transcriptions. For future studies that collect data from Chinese participants, a translator would be highly recommended in order to guarantee a data collection of higher quality. This would eliminate the language barrier and get more reliable and complete answers.

Fourthly, the raw data in this study were coded by only one researcher. Even though codes and themes were discussed with both the university and company supervisors to have stronger reliability, the main interpretation of the data was conducted only by the researcher alone. Hence, future studies could think of implementing a second independent coder to further boost the reliability of the data structure and findings.

Lastly, this study enables future research to determine culture within other business sectors besides the agricultural one. There could be other sectors where certain behaviour and a certain type of people are found. The establishment of business cultures can be helpful to improve the overall business practices.

7 Conclusion

This study explored the question: **"How can cultural mental model explain challenges in communication and international practices in high-tech agribusiness?"**. The study results have shown that the models of national culture, organisational culture, and agricultural culture explain challenges in communication, and high-tech agribusiness practices internationally. After describing the national culture and agricultural culture, the organisational culture appeared to be explanatory as well. The three different types of culture interfere with each other, on a communicational level (like Meyer's dimensions), but also on the more practical side of business operations. Culture explains why people from certain countries or sectors act in a certain way that may conflict with other cultures. Most challenges in international communication and international practices happen when different cultures, whether national, organisational, or agricultural, clash with each other. Also, being located in different countries has other, non-cultural, may result in challenges related to communication and business practices. Eventually, it is up to high-tech agricultural organisations to consider the findings when doing business internationally. To cope with the challenges as described in this study, people within the organisation should be aware of the occurring cultures and their differences, and how this reflects daily business practices. When people are aware of cultures and the differences, it is easier to take the extra mile to ensure proper communication for example. Besides the cultural aspects, high-tech agricultural international operating organisations should involve international colleagues in day-to-day processes. When international involvement is higher, challenges can be prevented or solved earlier.

To conclude, this study contributed to determining different cultural mental models in different countries, related to challenges that derive from them. Future studies need to examine closely how these challenges can be coped with. Because revealing bottlenecks is a start, actively solving the problems and improving overall business takes time and effort. As Albert Szent-Gyorgyi explained in his well-known quote: "Research is to see what everybody else has seen, and to think what nobody else has thought". Hopefully, this study contributed to scientific literature. Preferably it triggers other researchers to think outside their box and explore what challenges can be improved and how they should be done.

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Appendices

Appendix I: Interview questions

Interview questions

General themes	Questions	Probing questions
Opening	1. Why did you decide to work for [Research Company] NL/USA/CH?	General: - Why do you think so? - Can you elaborate a bit more on this? - That is interesting, can you offer some (more) examples - Why do you think this is good or bad for [Research Company]? - Do you have any experiences in this you would like to share? Regarding questions: 5. Is it more top-down, down-top, consensual? 7. Which challenges did you face? How do you think these could be solved? 8. What would you have done differently?
	2. What do you think are the best practices in [Research Company] NL/USA/CH?	
Cultural influences	3. How would you describe the culture of NL/USA/CH? How is your national culture reflected in [Research Company]?	
	4. How is [Research Company]'s leadership in NL/USA/CH? To what extent do you think this is similar (or different) to the leadership in other Dutch/American/Chinese companies?	
	5. How are decisions made within [Research Company]? (More top-down, down-top, consensual?)	
	6. How are negative feedback and disagreement communicated within [Research Company]?	
Communication and implementation (internationally)	7. What aspects of communication with other international offices went well and what aspects did not?	
	8. What aspects went well or bad when business practices and/or (new) products had to be implemented internationally?	
Ending	9. Is there anything else that you would like to add to this interview, which is not discussed yet but of importance to the study?	

Appendix II: Questionnaire

Demographic questions

1. What is your name?
2. What is your gender?
   - Male
   - Female
   - Other
3. What is your age?
   Here, the respondent can fill their age in years
4. How long have you been working at [Research Company]?
   Here, the respondent can fill in the number of years they have been working at [Research Company]
5. At what department are you currently working?
   - Sales Operations
   - Technical Operations (Technical Support or Application Support)
6. I experience challenges, possibly caused by cultural differences when working with international colleagues
   - Never
   - Rarely
   - Sometimes
   - Often
   - Always