UNIVERSITY OF TWENTE.

Master Thesis

How do people's attitudes towards AI in different national contexts affect the development of AI in the automobile industry? A cross-country study of Germany and China

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Abstract

AI has become a ubiquitous part of daily life for many people around the world. Companies have more possibilities to use AI to optimize some repetitive or dangerous procedures which are formerly performed by humans while people have common fear about AI because of the loss of employment opportunities and privacy. Meanwhile, AI has also become a cross-cultural phenomenon. It is believed that perceptions may vary between individuals and cultures, and the vision of the future of AI may also differ in emerging and advanced economies. Therefore, it is important to investigate individual or organizational differences in attitudes toward and trust in AI based on the cultural differences, understanding the relationship between culture and the use of AI.

This study conducts qualitative cross-country research between Germany and China, narrowing down the focus to analyze people's attitudes toward AI in the automobile industry. The main interview questions are divided into AI-related, Industry-related, and Future-related questions. It is critical to analyze how, why, and to what extent each dimension of cultural differences influence the use of AI. The dimensions include political, social, and individual levels. A thematic analysis has been conducted to analyze the collected data. This research aims at figuring out the potentially replicable, cross-culturally applicable factors which influence the attitudes towards AI, as well as generalizable associations valid across different cultures.

Keywords: AI, automobile industry, thematic analysis, China, Germany

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1. Introduction

In the course of industrial development, humans went through the revolution from mechanical technology to digital technology. Compared with advanced digitalization and manufacturing technology, the fourth industrial revolution has brought new fundamental paradigm shifts, which is not just simple manufacturing progress (Li, 2018). As focusing more on IT integration, it allows direct and automated communication between different parts of the value chain so that workers only need to intervene when a malfunction occurs (Arntz, Gregory, & Zierahn, 2019). Therefore, this study puts emphasis on the impact of the use of Artificial intelligence (AI), which can be considered as an up-to-date topic and worth further exploring at a country level.

One of the characteristics of "Industry 4.0" is the massive increase in computing power. Since 1945, computing power has increased by an average of 45% per year, which means that the cost of computing tasks has fallen dramatically (Nordhaus, 2007). A current example can be the GH200 chip that Nvidia has launched recently. It has been proved that the enhanced accessibility and sustainability of high-performance computing can make scientific breakthroughs occur faster, cheaper and greener (Caulfield, 2024). Born out of necessity, AI has become a ubiquitous part of daily life for many people around the world and is evolving at blistering pace.

ISO (n.d.) defines that AI is a technical and scientific field devoted to the engineered system that generates outputs such as content, forecasts, recommendations or decisions for a given set of human-defined objectives. Due to the improvements in training data and algorithms nowadays, the meaning of AI has expanded beyond simple data processing to include the development of machines that can learn, reason, and solve problems. On the one hand, because of digitalization, companies have more possibilities to use AI to optimize some repetitive or dangerous procedures which are formerly performed by humans. Increasingly complex tasks can also be automated with a high precision which can sometimes even exceed human precision (Brynjolfsson, Rock, & Syverson, 2017). Some additional jobs may be created thanks to the rise of productivity and real incomes. On the other hand, a common fear about AI is that it will destroy employment opportunities and privacy. Those rapid technical improvements have facilitated computer-controlled automation of routine tasks.

Since a number of jobs are at risk of automation, there has been a general decline in the demand for labor for routine tasks (Arntz et al., 2019). A report from McKinsey Global Institute estimates that 400 to 800 million workers will be replaced by AI and up to a third of current work activities could be impacted by 2030 (Manyika et al., 2017).

Therefore, whether digitization and automation lead to less or more jobs is still an open question, several literature put forward different pairs of effects to explain the current circumstances. PwC (2018) put forward the Displacement effect and Income effect. The two effects illustrate the positive and negative effects of the use of AI. The Displacement effect means the potential for AI and related technologies to replace human workers while the Income effect denotes the ability of these technologies to create additional jobs. The PwC (2018) report shows that the highest level of job displacement could be in the industrial sector (over 35%), which can be in accordance with the choice of the study to focus on the automobile industry. Similarly, Arntz et al. (2019) put forward the Substitution effect and Complementarity effects. AI replaces workers because automation replaces tasks that workers previously performed. And AI also complements other workers because more other types of workers who perform tasks that are complementary to the machines are required. It is critical to note that interpersonal interaction, flexibility, adaptability, and problem solving are still the comparative advantages held by the workers (Autor, 2015), which is hard to be replaced by AI.

At the same time, the industrial revolution led to globalization. This has resulted in the redistribution of wealth among emerging economies and advanced economies because of the ever-changing and emerging opportunities and challenges. For instance, there are more opportunities for international trade nowadays while some problems of political and economic instability may also occur. Many cross-country studies, which aim at studying the differences between the countries in the context of emerging and advanced economies, have been developed in a general way (e.g. Grau, Huo, & Neuhoff, 2012, Chang et al., 2021). When referring to the specific field of AI, there is a lack of detailed literature. Either a rough overview report (e.g. Neudert, Knuutila, & Howard, 2020) or a research only focusing on the countries with similar contexts (e.g. Goethner & Obschonka, 2022) can be found. It is surprising that little is known about different attitudes towards AI due to cultural differences between European and Asian countries which possess advanced and emerging economies respectively. AI has become a cross-cultural phenomenon. It is believed that perceptions may

vary between individuals and cultures (Gerlich, 2023), and the vision of the future of AI may also differ among emerging and advanced markets around the world. Therefore, in order to fill the research gap, it is important to investigate individual or organizational differences in attitudes towards AI, along with trust and anxiety about AI based on the cultural differences, and to understand the relationship between culture and their attitudes toward AI.

Since there is not enough cross-country research to focus on one specific industry, this paper narrows down the focus to analyze people's attitudes toward AI in the automobile industry. The reason why I chose to analyze the automobile industry is because it is an integral part of the global economy. It is very comprehensive, as it covers all aspects of the value chain – from raw materials to design and development, manufacturing, sales and service (Townsend & Calantone, 2013). Due to environmental and competitive influences, all of these aspects are undergoing significant innovation shifts and innovation is considered to be a key factor for a firm's competitiveness (Jean, Sinkovics & Hiebaum, 2013). The argument is very evident in the automobile industry, as the competitive environment and the product development method in this specific industry have changed significantly. As innovation is the long-term viability basis of the automobile brand, AI has become a vital enabler in the automobile sector and is integrated into most of the steps when going through the life cycle, ranging from construction to management of the industry.

When it comes to the country I would like to choose for research, two countries come to my mind: Germany and China, for they represent two of the world's most influential markets, each playing a critical role in the global automobile landscape. Germany, renowned for its engineering excellence and home to automotive giants like Volkswagen, BMW, and Mercedes-Benz, has long been a leader in automotive innovation. The country's focus on high-quality manufacturing and technological advancement is well-documented (Womack, Jones, & Roos, 1990). In contrast, China's automobile industry has experienced rapid growth, driven by a combination of government support, a burgeoning middle class, and aggressive expansion strategies by domestic manufacturers like BYD, Geely, and NIO (Li & Lazonick, 2022). The automobile companies in both countries are at the stage of integrating AI into different phases of the product life cycle. For example, Volkswagen's AI strategy is comprehensive, spanning autonomous driving, smart manufacturing, customer experience, research and development, and sustainability. It puts emphasis on e-mobility and digitalization, developing new platforms to optimize the interaction between hardware and

vehicle software (Volkswagen Group, 2023). Xiaomi aims at redefining the technology of the automobile industry by integrating industrial manufacturing, intelligent software, and AI. The "people x cars x homes" smart ecosystem achieves seamless connection and real-time collaboration of individuals, devices, and intelligent services (Xiaomi, 2023).

In addition to the development of the automobile industry in the two countries, the national conditions are also the reason why I chose to conduct a cross-country research between Germany and China. They typically represent different cultures and economic ideologies. The quality of changes caused by AI may vary depending on the current industrial structure of each country. Townsend and Calantone (2013) suggest the difference in competitive development between mature and emerging economies. Two representative plans have been put forward under the background of emerging economies and advanced economies respectively. The industrial revolution prompted the introduction of the "Made in China 2025" plan released in May 2015 (Wübbeke et al., 2016) and Germany's "Industry 4.0" plan announced in April 2013 (Lasi et al., 2014).

Li (2018) notes that the "Made in China 2025" plan marks the start of China's industrial transformation from labor-intensive production to knowledge-intensive manufacturing. The focus of the plan is to build solid manufacturing capabilities by developing advanced technologies, researching new materials, and producing key components for major products. Since Germany is famous for the design and quality of its products, the goal of the "Industry 4.0" plan is to raise the organization and control of the entire value chain of the product life cycle to a new level. Those leading industrial brands have effectively used digital technology to create new industrial environments and produce new products, so as to emphasize their innovative strength (Li, 2018). The plan focuses on the integration of physical base systems and software systems, integration with other sectors and economic sectors, integration with other industries and industry types (Hermann et al., 2016).

These multifaceted approaches ensure that AI is integrated into many aspects of the companies' operations. In order to achieve a more responsible and beneficial use of AI, guidelines and regulations are needed. As the first-ever legal framework on AI, the AI Act aims to create a comprehensive regulatory and legal framework for AI. This regulation classifies AI systems into different risk categories and sets out specific requirements and obligations for developers and users, with stringent rules for high-risk AI applications

(European Commission, 2024). As part of Europe, it is interesting to investigate how Germany reacts under this circumstance.

Unlike EU countries that emphasize regulated, safe, and ethical AI development, China pays more attention to swift adoption and technological advancement. According to a report in terms of EU-China trade, Eurostat (2024) shows that EU imports of manufactured goods (97%) from China had a dramatically higher share than primary goods (3%) in 2023. The most imported manufactured goods were machinery and vehicles (57%). These statistics indicate China's ambition to move up the value chain, providing the data support for the focus of the research. China is no longer the market with the lowest labor costs, as it has been squeezed by other newly emerging low-cost producers such as Vietnam and Cambodia. But at the same time, China is not the strongest player to compete in the high-tech field, as mature industrialized countries such as the United States and Germany still dominate the markets (Li, 2018). Because of the rapid evolution, it is interesting to investigate how China deals with the ongoing opportunities and challenges.

Germany's methodical and safety-oriented approach contrasts with China's rapid and market-driven expansion, reflecting broader national attitudes towards technology and innovation, as well as AI. This research aims at figuring out the potentially replicable, cross-culturally applicable factors which influence the attitudes towards AI, as well as generalizable associations valid across different cultures. Because of the lack of measurable empirical evidence and rigorous academic research, it is critical to analyze how, why, and to what extent each dimension of cultural differences influence the use of AI. The dimensions include political, social, and individual levels. The results would reveal the key challenges and solutions for AI implementation and development in the future.

To sum up, three important elements of the research have been mentioned above: AI, national contexts, and automobile industry. This study thus sets out to address the following research question: How do people's attitudes towards AI in different national contexts affect the development of AI in the automobile industry? In the end, which dimensions of cultural differences influence people's attitudes towards AI, challenges during the use of AI, and future expectation should be figured out.

The structure of this study is designed to ensure a coherent and systematic exploration of the topic, starting with a detailed introduction that outlines the research objectives and significance. Section 2 delves into the theories, providing some literature support of the levels of cultural differences. Section 3 presents the research design and methodology, explaining the sample characteristics, data collection process, and data analytic procedures. In Section 4, the findings with regard to different perspectives of interview questions are presented and analyzed. The common grounds and differences of the interviewees from the two different countries can be discovered. Two thematic maps, which highlight the key patterns and insights, will be shown. Section 5 discusses the implications of these findings in the context of existing knowledge and case studies. In the end, it concludes the thesis by summarizing the main points, putting forward its theoretical and practical contribution, discussing limitations, and offering recommendations for future research.

2. Theoretical background

The core of the theoretical background of this study is the Integrated fear acquisition theory referring to the use of AI. As technology advances, we have to admit that AI has surpassed humans in many aspects. Hence, AI anxiety has become a widespread universal phenomenon, which may generate a series of social issues. Integrated fear acquisition theory (Li & Huang, 2020) combines Rachman's (1977) fear acquisition theory and Menzies and Clarke's (1995) non-correlated fear acquisition theory. It illustrates four pathways of AI anxiety acquisition and each pathway includes two factors. The Conditioning pathway includes privacy violation anxiety and bias behavior anxiety, the Vicarious exposure pathway includes job replacement anxiety and learning anxiety, the Transmission of information and instruction pathway includes existential risk anxiety and ethics violation anxiety, and the Inability to recall a pertinent experience pathway includes artificial consciousness anxiety and lack of transparency anxiety.

This study aims at exploring the dimensions of AI anxiety. It can help clarify the social problems that AI may cause, analyze the defining characteristics of AI anxiety, provide directions for future research, and lay the foundation for regulating AI behavior (Rahwan et al., 2019). Recent studies leveraging the Integrated fear acquisition theory have provided significant insights into how fear and anxiety disorders develop and persist. For example, this theory guides research to analyze human-robot collaboration and interaction, investigating

the transition from robophilia to robophobia (Jin, 2024). The theory has also been used to illustrate people's attitudes toward using virtual assistants (Blut, Wünderlich, & Brock, 2024).

Table 1. *AI Anxiety Supporting Literature (Li & Huang, 2020)*

Items	supporting literature(original)
Privacy Violation Anxiety	
(1) I'm afraid that artificial intelligence (AI) will monitor my behavior [26].	I am fearful that someone is using technology to watch and listen to everything that I do. (Khasawneh,2018)
(2) I'm worried that AI will collect too much of my personal information [76].	I'm concerned that companies are collecting too much personal information about me. (Smith&Burke,1996)
(3) AI's predictions of my preferences, such as well recommended ads or web pages, make me feel that my privacy is violated [34].	Google then, implicitly acknowledges that, however automated the process(generation of ads), if details were forwarded on to third parties, a violation of privacy would occur.(Chopra&White,2007)
Bias Behavior Anxiety	
(1) It is unacceptable if AI is racially discriminatory [58].	A greater percentage of Instant Checkmate ads using the word "arrest" appeared for black-identifying first names than for white first names. (Sweeney,2013)
(2) AI sets different prices (price discrimination) for different people, which is unfair [17].	Online pricing algorithms shape the cost of products differentially across consumers. (Rahwan et al., 2019)
(3) AI treats different people differently, which can make me anxious [31].	In an analysis of the context of the use of the term 'girl', research has shown that girls and boys are represented differently with girls being more objectified and portrayed in more negative contexts. (Leavy,2018)
Job Replacement Anxiety	
(1) I am worried that AI will replace my work in the future [5].	Our scenarios across 46 countries suggest that between almost zero and one third of work activities could be displaced by 2030, with a midpoint of 15%. (Manyika Global Institute,2017)
(2) I feel anxious working with AI that is smarter than me [50].	I dislike working with machines that are smarter than I am. (Heinssen et al., 1987)
(3) I'm worried that AI will replace many people's work [5].	Our scenarios suggest that by 2030, 75 million to 375 million workers (3–14% of the global workforce) will need to switch occupational categories. (Manyika, Lund et al., 2017)
Learning Anxiety	
(1) I do not think I would be able to perform well in professional courses in AI [50].	I do not think I would be able to learn a computer programming language. (Heinssen et al., 1987)
(2) Understanding AI algorithms requires a high level of talent, which is difficult for me [50].	I have difficulty in understanding the technical aspects of computers. (Heinssen et al., 1987)
(3) AI technology updates too quickly and is very difficult to learn [3].	By playing itself and determining which moves lead to better outcomes, AlphaGo literally learns by teaching itself. And the unsettling thing is that we don't understand what AlphaGo is thinking. (Granter, Beck,Papke, 2017)
Existential Risk Anxiety	
(1) AI may harm humans to achieve a goal, which gives me anxiety [20].	we could mistakenly elevate a subgoal to the status of a super goal. AI may in the process killing the person who asked the question. (Bostrom,2002)
(2) I worry that the control of AI by a few individuals will introduce great risks to the entire society [65].	In popular culture (science fiction movies/books) AIs/Robots rebel against humanity and decide to destroy it. We suggested that much more likely reasons include deliberate actions of not-so-ethical people ('on purpose'). (Yampolskiy,2016)
(3) The runaway of super AI will reduce the amount of time that humans stay on earth and will even result in human extinction, which is terrible [20,26].	If this runaway process is sudden, it(AI) could result in one upload reaching superhuman levels of intelligence. Such enormous intellectual superiority may well give it correspondingly great power. (Bostrom, 2002) I am afraid of new technologies because if something goes wrong with it (if it stopped working for some reason) we will go back to the Stone Age. (Khasawneh,2018)
Against Ethics Anxiety	
(1) I worry that humans have special feelings (such as love or adoration) for super AI [67].	as technology evolves it is expected that these humanoid robots will act in a more human like manner that will potentially lead to emotional bonds. (Gonzalez-Jimenez, 2018)
(2) I am disturbed that AI can deceive (for example, enticing people to buy goods) [68].	The Turing-esque goal—of fooling customers into thinking that the supplier really cares about their satisfaction and will accommodate requests to ensure it—is closer by the upgrade. (Gunkel, 2012)
Artificial Consciousness Anxiety	
(1) I worry that AI will attain the same level of consciousness as humans [53].	the main difference with respect to the natural counterpart (artificial consciousness) depends on the hardware that generates the process. (Buttazzo, 2008)
(2) The fact that AI that cannot tell the difference between humans and being conscious makes me uneasy [69].	AIs with sufficiently advanced mental states, or the right kind of states, will have moral status, and some may count as persons. (Bostrom&Yudkowsky,2014)
(3) AI has the same level of consciousness as humans, thus challenging the status of humans, which makes me anxious [69].	Insofar as moral duties stem from moral status considerations, we ought to treat an artificial mind in just the same way as we ought to treat a qualitatively identical natural human mind in a similar situation. (Bostrom&Yudkowsky,2014)
Lack of Transparency Anxiety	
(1) It's worrying if you do not know which part of AI has erred after AI makes a mistake [15].	Even where an outcome appears to be in error, the factors that gave rise to it may not be discoverable. (Clarke,2019)
(2) I worry that people cannot figure out how AI makes decisions [15].	A description of how and why an outcome came about may not exist, with the result that no humanly-understandable explanation can be provided. (Clarke,2019)
(3) The responsibility for addressing operational failures in AI may be confusing [15].	AI's opaqueness may be seen as a force that is beyond the capacity of a human entity or organization to cope with, thereby absolving it of responsibility. (Clarke,2019)

As is shown in Table 1, Li and Huang's paper shows the comprehensive and detailed literature support of the clearly defined eight factors. The source of each statement is well explained. By conducting quantitative research, each statement of the eight AI anxieties is tested. Those factors gave me the direction of further research and inspired me for the design of interview questions, so that people's attitudes towards AI can be precisely analyzed.

Since these eight factors set the foundation of my analysis of people's attitudes toward AI, I would like to illustrate them in detail as follows:

- Privacy violation anxiety: It happens when users face direct privacy breaches by AI. Some unsupervised AI such as targeted advertising and face recognition may cause the anxiety about infringement on personal privacy (Evans, 2009). People are afraid of the misuse or alteration of the private data.
- Bias behavior anxiety: It occurs when AI adopts different strategies for different groups through data analysis, resulting in large-scale group discrimination, which can make the discriminated groups feel that they are being treated unfairly and cause anxiety (Lloyd, 2018). AI is sometimes designed to categorize individuals and provide customized advice. Thus, AI is assumed to exhibit biased behavior, for sometimes the training datasets are biased (Li & Huang, 2020), so that biased decisions may be made by humans.
- Job replacement anxiety: It is caused by observing others experiencing or worrying about being replaced by AI, which is related to people's concerns that AI will replace humans in a wide range of occupations (Carleton, 2016). Some affected industries have been illustrated in several literature, such as automobile, healthcare, translation, etc. This is also corresponding to our choice of the industry that this study is going to focus on. Unemployment or poor job prospects can trigger anxiety (Li & Huang, 2020).
- Learning anxiety: It is also caused by observing others experiencing or learning AI. Since AI is an algorithmic technology, people may find it difficult and complicated to learn (Rosen, Sears, & Weil, 1987). Therefore, because of the threat made by AI, the perceived difficulty of learning AI technology can lead to anxiety.
- Existential risk anxiety: It imagines that all intelligent life on Earth will lose its potential for survival, having the risk of extinction (Bostrom, 1987). Yukdowsky (2008) also describes that the risk of super AI is destroying humanity and causing rapid evolution of AI.

- Ethics violation anxiety: It suggests that AI may exhibit behaviors that violate human ethical rules when interacting with humans (Anderson & Anderson, 2007). The boundary between AI and humans will become increasingly blurred, followed by a series of ethical issues. So it is necessary to ensure that the behavior between AI and humans complies with ethical standards, otherwise, it will lead to anxiety. In the case of my study, this anxiety may occur when we talk about the risk allocation between passengers and pedestrians while using autonomous driving (Nyholm & Smids, 2016).
- Artificial consciousness anxiety: It refers to people's innate anxiety about the possibility that artificial consciousness may undermine the uniqueness of human intelligence (Buttazzo, 2008). It is assumed to be possible for AI to produce artificial brains with human-like consciousness (Chella & Manzotti, 2010), which may lead to some problems during its interaction with humans. Since humans' status has been challenged, the boundary between AI and humans may also further blur.
- Lack of transparency anxiety: It refers to the innate anxiety about the unknown aspects of AI decision-making mechanisms (Clarke, 2019). Voosen (2017) mentions the possible result of black boxes. These arguments suggest that a lack of transparency will cause the mechanism of AI operations and its decision-making process to be unclear, making it impossible to predict AI behavior. Moreover, Clarke (2019) also points out the difficulty to determine whether AI errors are due to decision-making problems of the AI itself or intentional by the designer.

Since this research aims at analyzing how each dimension of cultural differences influence the attitudes towards the use of AI, some literature support of these dimensions will be provided in this part. From a macro to micro perspective, the dimensions include political, social, and individual levels.

First, it is obvious that Germany and China have different political views. Institutional theory can be applied to understand how different institutional contexts influence the adoption and implementation of AI in the automobile industry. Institutions constitute regulative, normative, and cognitive structures and engage in activities that provide stability and meaning to social behavior (Scott, 2008). A term called "Institution reconfiguring" refers to policy flexibility and social adaptation (Rong et al., 2017). The key drivers of global manufacturing include the pursuits of markets, resources, strategic assets, and efficiencies (Zhang, Gregory & Shi,

2008). The strategies of industrialized countries have turned to focus on high-tech products and technologies, reducing the proportion of labor-intensive, low-value-added, and low-profit production, which has led to a reconfiguration of global manufacturing (Li, 2013).

Second, the increasing use of AI is likely to challenge cultural norms and act as a potential barrier within certain sectors of the population, which leads to potential job losses and the intensified competition for remaining jobs (Dwivedi et al., 2021). The challenges and opportunities of social change caused by AI are likely to have complex impacts on the diffusion of AI goods and services. Social influence has a significant impact on acceptance of AI products (Chen et al., 2020). Businesses will experience economic gains and losses during the transition (Bughin et al., 2018). These impacts cover the economic, ecological, and social aspects referring to the Triple Bottom Line (TBL) of sustainable value creation. To explain these phenomena, Social cognitive theory can be applied. It states that portions of an individual's knowledge acquisition can be directly related to observing others within the context of social interactions, experiences, and outside media influences (Bandura, 1986). Those factors involved, which influence the adoption of AI in different economies and social contexts, will be further discussed in the "Research design" part.

Lastly, at the individual level, personality may also need to be noted. It is interesting to analyze the interviewees' Big Five of personality, which includes Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, during the interview. Among these five, Openness and Neuroticism may be the most important factors in determining people's attitudes toward AI. Openness describes individuals who are open to new ideas and experiences while Neuroticism individuals are anxious and worried a lot (Sindermann et al., 2022). Prospect theory describes how people make decisions when presented with alternatives that involve risk, probability, and uncertainty (Kahneman & Tversky, 1979). It holds that people make decisions based on perceived losses or gains. Another study shows that personal innovativeness and perceived risk has a direct impact on the acceptance intention for emerging technologies (Chen et al., 2020). Hence, it is interesting to analyze people's decision making process, especially based on their trust and anxiety of AI.

3. Method

3.1 Research design

This paper will employ a qualitative method, using a pair-wise comparison of case research on German and Chinese automobile companies. The reason why I chose the qualitative method is because it is invaluable for its ability to capture the depth and complexity of human experience (Denzin & Lincoln, 2011). I can get insights about the interviewees' attitudes toward AI and stories in the industry in detail from a variety of perspectives, as well as developing in-depth understanding of the phenomena. Several semi-structured interviews will be conducted with workers who have similar working positions from both sides, asking how they expect the impact of the use of AI in the industry. I choose semi-structured interviews because of the possibility to focus on some points while still having the autonomy to explore relevant ideas and new areas during the interview (Adeoye-Olatunde & Olenik, 2021), which fits the purpose of this study quite well.

The interview questions, which are all open-ended questions, are divided into three parts (see Appendix 7.1). The AI-related questions are in accordance with Integrated fear acquisition theory as mentioned before. Eight questions are asked based on the eight types of anxiety. Based on the first half of the questions, I can get their general attitudes towards AI which shows their trust or anxiety about the development of AI. Then I move to the Industry-related questions, which are specific about the AI implementation in the automobile industry. Questions about policies, social and economic challenges are expected to be answered in this part. In the end, there are also some Future-related questions to understand the interviewee's anticipation and the trend in the future. Therefore, a deep understanding of people's attitudes towards the use of AI in the automobile industry is expected to be gained.

After collecting the data from the interviews, a thematic analysis will be conducted. This inductive approach is more appropriate to apply to this study, as it is a process of coding the data without attempting to fit it into a pre-existing coding frame or the researcher's analytical preconceptions. As a foundational method for qualitative analysis, thematic analysis can be used to identify, analyze, and report the themes within data (Braun & Clarke, 2006). The themes identified are closely related to the data themselves (Patton, 1990), so that various aspects of the research topic can be interpreted and the dataset can be described in detail

(Boyatzis, 1998). This approach can provide a rich description of the data overall, which will be detailed insights into the experiences, external factors, and attitudes towards AI in this study. After collecting the data, relevant questions and repeating topics from the interviews will be identified, semantic codes and latent codes can be further defined. During the analysis, data will be organized thematically around common themes that emerged from the interviews. In the end, the effective factors based on cultural differences will be figured out.

3.2 Sample

All of the interviewees are employed in different companies related to the automobile industry, either in China or in Germany. The basic information and working positions of the interviewees are shown in Table 2. In order to avoid information leakage, the company information is given as a rough overview rather than naming names. Internships and student jobs are excluded, for these experiences may not be enough to understand the relatively complicated conditions in the industry. Retired employees are also excluded, because this study focuses on the up-to-date topic of AI, the retirees may not have the chance to know the current situation of the company or the industry, and the opinions put forward by them may be outdated and not suitable for this research. According to the study of Gould (1979), he claims that both years of working experience and whether the respondents are in stabilization stages or trial stages may influence the result. As my study is to compare the attitudes towards the use of AI in the automobile industry, certain experiences of using AI at work is assumed to be more research-worthy and persuasive. Therefore, two preconditions for the participants should be met. They should currently work full-time in a company in the automotive industry and have experience of using AI at work.

Table 2. *Interviewees' Brief Information*

Interviewees	Working position	Company
1. CHN, Female, 32	Client software product engineer	A local car manufacturer
2. CHN, Female, 27	Logistics specialist	A transnational automobile giant
3. CHN, Male, 50	Workshop manager	An auto-parts supplier
4. GER, Female, 34	Application engineer	A transnational automobile giant
5. GER, Male, 41	System development engineer	A transnational automobile giant
6. GER, Male, 53	Product manager	An auto-parts supplier

In order to obtain a comprehensive point of view, it is critical to pursue the diversity of the sample. In this study, the interviewees should cover different organizational levels and different departments in the companies. The organizational levels should range from production line levels to managers at middle or higher levels. The potential departments involved can be manufacturing, technology development, supply chain management (procurement, sales, logistics), marketing, IT, etc. Those interviews provide broader, sector-level insights to the study and are also meant to reflect upon views which are expressed by individuals in order to provide context and verification.

What I need to note is that the quality of interviewees is more important than the quantity. By appropriately defining the units of observation and analysis, researchers can improve the quality, richness, and depth of the data (Roy et al., 2015). The richness of data comes from detailed descriptions, but not the number of statements. That is why I selected the sample to contact and interview from the two countries to make the analysis become more comparable.

In total, I conducted 6 interviews, 3 with Chinese interviewees and 3 with German interviewees. The interviews lasted approximately 30 to 60 minutes each and were held via online conference calls. The respondents from one country cover the genders as male and female, and the organizational levels as specialist, engineer, and manager. The age range of the participants lies between 27 and 53 years, and the years they have been involved in the automobile industry range from 3 to 28 years. It is interesting to point out that one experienced employee from each country is involved. They are in their fifties and both have around 28 years of experience in the automobile field. The interviewees include client software product engineer, logistics specialist, workshop manager, application engineer, system development engineer, and product manager. The interviewees cover the departments as Technology development, Manufacturing, and Supply chain management. As AI has a huge impact on these departments, the variety of participants can capture a multifaceted view of my research question.

3.3 Measures

A thematic analysis will be conducted to analyze the collected data, for it can report experiences and the reality of participants. One of the advantages of thematic analysis is its

flexibility. It is important for the researchers to make explicit the theoretical stance of thematic analysis and assumptions while applying the method to data (Holloway & Todres, 2003). Because of its theoretical freedom, thematic analysis can be considered as a flexible and practical research tool that can provide a rich, detailed, but complex description of the data (Braun et al., 2006), which is more accessible for data analysis and reflects reality.

This can lead to the second advantage of its accessibility. A theme can capture important information about the data which is relevant to the research question and represents a meaning within the data set (Braun et al., 2006). Because of the topic and practical significance, the thematic analysis will be conducted within constructivist paradigms in this study. Burr (1995) puts forward that from a constructionist perspective, meaning and experience are socially produced and reproduced, rather than inherent to the individual. The thematic analysis in this study will not focus on motivation or individual psychologies, but rather seeks to theorize the socio-cultural context that informs the individual narratives.

In the work of Braun et al. (2006), they provide an outline to guide me through the several phases of thematic analysis. The guidelines need to be applied flexibly to fit my research question and data, so that it may not be a linear process, but rather more iterations are needed throughout the journey. Ely and his colleagues (1997) also describe it as a recursive process where we move back and forth between phases as needed. According to the specific situation of my research, the process of the thematic analysis has been divided into four phases.

First, since I am dealing with verbal data as interviews, I need to transcribe the data into written form in order to conduct thematic analysis. All the interviews were recorded and transcribed. Riessman (1993) considers it as an excellent way to become familiar with the data. Bird (2005) regards it as a critical phase of data analysis in interpretive qualitative methods. A more thorough understanding of the data can be obtained during this phase. All the transcripts of the interviews have been attached in Appendix 2.

Second, after reading through and becoming familiar with the data, a list of initial ideas about what is in the data should be generated (Braun et al., 2006). The initial codes from the data should be generated in this phase. Boyatzis (1998) describes the initial codes as the most basic elements of the raw data or information that can be used to assess the phenomenon in a meaningful way. At the same time, I can also start to find and summarize the reasonable

themes which are usually broader than the coded data, as themes are abstract constructs that researchers identify before, during, and after analysis (Ryan & Bernard, 2000). As a result, the thematic map will be iterated during the whole recursive process of coding and analysis. Moreover, Braun et al. (2006) also highlight the importance of giving full and equal attention to each data item, and identifying interesting aspects of the data items that may underlie recurring themes across the data set.

The third phase refocuses the analysis on a broader thematic level rather than a code level, categorizing the different codes into potential themes (Braun et al., 2006). The themes will be developed and iterated, so that I can interpret my findings and put forward the arguments for the phenomena. It may be helpful to use a visual representation to help me categorize the different codes thematically. After the generation of the initial thematic map, I need to think about the relationship between codes and between themes, leading to a refinement of these themes. Some of the themes may need to be combined, refined, or discarded (ibid.) because of their different levels of significance, so that each theme can be coherent and form a logical story line together. This process will be illustrated in detail in 4.3.

In the last phase, the themes should be clearly defined. I need to conduct and write a detailed analysis for each individual theme, as well as relating it to my research question. In the following results part, some representative and easily identifiable data will be quoted to demonstrate the findings and the quotes will be embedded in an analytical narrative.

4. Results

4.1 AI-related findings

As a first step of analyzing the data, Table 1 has been summarized to provide an overall view of the interviewees' eight types of anxiety about AI. Every respondent is numbered, so that it will be easy to refer to during the results analysis. Respondents 1 to 3 are from China and Respondents 4 to 6 are from Germany. Nationality, gender, and age of each respondent can be seen in the first row of Table 3. The results of respondents' anxiety about AI from different cultural backgrounds reveal four findings as follows:

Table 3. *AI Anxiety Results*

	1. CHN Female, 32	2. CHN Female, 27	3. CHN Male, 50	4. GER Female, 34	5. GER Male, 41	6. GER Male, 53
Working position	Client software product engineer	Logistics specialist	Workshop manager	Application engineer	System development engineer	Product manager
Department	Technology development	Supply chain management	Manufac-turing	Manufac-turing	Technology development	Technology development
General view	Positive	Positive	Positive	Positive	Positive	Positive
Job replacement	Yes	Yes	Yes	Yes	Yes	Yes
Learning	No	Yes	No	Yes	No	Yes
Privacy violation	Yes	Maybe	Maybe	Maybe	Maybe	Yes
Bias behavior	Yes	No	No	Yes	Yes	Yes
Artificial conscious-ness	No	No	No	No	Maybe	Yes
Lack of transpa-rency	No	No	No	No	Yes	Yes
Ethics violation	No	Maybe	No	Maybe not	Yes	Yes
Existential risk	No	Maybe	No	No	Maybe	Maybe
Overall grade	3	3.5	1.5	4	5.5	7.5

In order to make the results become more intuitive, I use numbers to represent the contents in the table cells: Yes = 1, No = 0, Maybe (not)= 0.5, which means that the higher the number, the greater the anxiety about AI. The overall grade of each participant is shown in the last row of the table. It is interesting to note that the average overall grade of Chinese respondents is 2.6 while the average overall grade of German respondents is 5.7. As a result, Chinese respondents in this study show less anxiety about AI than German respondents. However, because of the limited sample size, the scores cannot be used to explain the general phenomenon. Therefore, the common grounds and additional nuances with specific focus should be illustrated.

The results show some aspects in common for the employees from the two countries, which is corresponding to the initial understanding of AI mentioned in the introduction. On the one hand, regarding the general attitude towards AI, all the interviewees show a positive attitude.

This attitude may come from the confidence in the development of this industry, the advantages of AI, one's own understanding of life, etc. For example, respondent 2 from China states that: *"I believe the rise of the AI industry will definitely be the general direction in the future, which will flourish for many years. So I think we must trust this industry."* Meanwhile, respondent 6 from Germany highlights that: *"Because the development of mankind is to make machines serve mankind. People come to the world not to work, but to enjoy life. Life cannot be framed on the production line. We must liberate the labor force, and let people do things that use their minds, instead of simple work."*

On the other hand, the anxiety of job replacement and privacy violation of all the interviewees have been revealed. Almost all of them mention some keywords about AI such as *"improve efficiency"*, *"do better and faster than humans"*, but they also suggest that the job replacement may only occur in some simple tasks like *"repetitive and mechanical jobs"* currently. Just like the point proposed by respondent 2: *"What is reduced is low-level labor, but more people who can use intelligent software or a complete set of IoT devices will be hired. So fewer people are hired, but the quality of the people hired is also higher."*

Despite all the interviewees showing concerns about privacy violation, people from different countries have different focuses. Chinese respondents focus more on the individual's sensitivity to information privacy and the privacy infringement issues which the companies may be involved in while German respondents put more emphasis on the significance of regulations and specific rules. Respondent 4 from Germany points out that: *"After all, AI is just a tool. The key is who controls it. If it is well controlled, it will be beneficial. If it is not well controlled, it will be harmful and bring hidden dangers to social security and order."*

To summarize the main common grounds which have been discovered from both sides, I reach the first finding:

Finding 1: All the respondents hold a positive attitude towards the application of AI, even though they all believe that AI will replace some jobs and may violate privacy.

The following findings will focus on the differences between the Chinese and German respondents. Speaking of the Bias behavior anxiety, one respondent from each country shares a similar viewpoint. They admit that *"AI may guide some trends and affect some people's decisions."* For other respondents, they treat this issue with different focuses.

The Chinese respondents do not show many worries as they believe AI has not reached the level to make a decision for humans. Respondent 3 claims that: *"If the data collection is accurate and consistent with the actual situation, there should not be a big problem while analyzing. We use AI to discover the flaws in the whole operation and make adjustments by ourselves."* At the same time, the German respondents are much more worried about the existence of information cocoons while using AI. Respondent 6 mentions that: *"Almost all the information you collect is the information you like and are willing to receive. This will cause cognitive bias and incomplete understanding of external information, which will lead to decision-making bias."* Hence, the second finding is put forward:

Finding 2: Chinese respondents think AI will not cause bias in decision making while German respondents think AI will.

The most contrasting result is people's perception of transparency. The result of Lack of transparency anxiety is based on the aforementioned Bias behavior anxiety. Because of the information cocoons mentioned by the German respondents, they believe AI may lead to lack of transparency. This can be reflected in *"AI analyzing your mindset and providing customized information according to your needs"*, as well as *"the companies that dominate AI having a tendency to resist transparency."* However, the Chinese respondents hold the opposite view. Since they think AI has not reached the decision-making level for human beings nowadays, they believe the use of AI can enhance transparency instead. Some keywords like *"fixed standards"*, *"more controllable",* and *"reflect the status truthfully"* are shown. Respondent 2 claims that: *"AI will not conceal information and do anything intentionally. Its behavior is fair and just, and it won't be jealous or envious as humans. I think everything it does is open and transparent, unless it is controlled by humans. AI only provides objective information and cannot help us choose."* Therefore, the third finding is discovered:

Finding 3: German respondents think AI may lead to lack of transparency while Chinese respondents think contrarily.

Among the eight factors, Artificial consciousness anxiety, Ethics violation anxiety, and Existential risk anxiety can be regarded as ethical issues, which can be clustered together to analyze. Almost all the Chinese respondents are not anxious about these aspects during the use of AI. This is based on their views that AI is only a tool and relies on cold data. They

point out the importance of reflexes, personal experiences, and emotion, which only humans possess and are not imitable. Just as the arguments put forward by Respondent 1: *"The level of human consciousness comes from many environmental elements, and there is a process of cultivation. From the age of 10 to the age of 30, you have gone through school education and also improved your abilities during social activities. This is not 100% imitable by AI. And even if it can be imitated, I don't think it makes sense. Without soul and emotion, it cannot be called a human being."*

Moreover, the Chinese respondents view their attitude toward AI as a personal decision. Just like how Respondent 1 treats the issue of privacy violation, she says that: *"It depends on the individual's sensitivity to information privacy. I personally can accept it, but some people may not."* Similarly, according to the interviews with the Chinese respondents, how people will behave regarding ethical issues also depends on the individual. Respondent 2 notes that: *"I think it depends on how individuals treat AI. If you rely too much on AI, you may lose yourself and have different behaviors."* Therefore, they put more emphasis on self-improvement, such as *"improve irreplaceability"*, *"become inter-disciplinary talents"*, etc. The reason behind these expected improvements is because the current existential problem that they can think of is the reduction of some jobs, which may threaten some people who originally made a living from these jobs. Respondent 1 applies the principle of survival of the fittest of nature to the society, stating that: *"Those whose abilities cannot keep up with the development of the times will naturally be eliminated."*

When analyzing the results from the German respondents, it is interesting to note that only one respondent shows she is not worried about the ethical issues. She holds almost the same view as the Chinese respondents. Nevertheless, the other two think it is possible for AI to reach the same level of consciousness as humans because AI can be perfected and have enough training data. Respondent 5 claims that: *"AI itself does not have ethical judgment and needs human training. AI may make many work handling methods absolute and very rigid, which may ignore people's feelings and lead to some problems."* Unlike the Chinese respondents focusing on the individual level, they suggest the significance of regulations. Respondent 6 mentions that: *"If we don't draw boundaries and let things develop, there will definitely be problems."*

Since the two respondents who hold a worried state of mind are relatively old among the sample, the age may also affect people's attitude towards those issues. But I notice that respondent 3 from China, who is about the same age as the two respondents, looks at the problems in the opposite way. Therefore, I would still attribute the fourth finding to different cultural backgrounds:

Finding 4: German respondents worry more about the ethical issues of AI than Chinese respondents.

Besides, Learning anxiety is not shown in any of the findings above. It is because I have not seen any obvious differences in the results between the respondents due to cultural differences. Instead, other potential factors which may cause Learning anxiety have been found based on the interview results.

Respondents 1 and 3 from China and Respondent 5 from Germany have the confidence to learn well as it can be under control. But at the same time, they also point out the necessity of learning. Respondent 3 notes that: *"I have to attend some training, otherwise I will be eliminated."*, which is corresponding to the Chinese's emphasis on self-improvement mentioned in Finding 5. Respondent 5 explains that: *"The specific requirements for AI tools were proposed by engineers, so we have to learn well to be able to use AI."* Respondent 2 from China and Respondents 4 and 6 from Germany do not have the confidence to learn well, for AI learns too fast and it is hard to catch up with it. Respondent 4 also believes that: *"It requires a high level of talent to compete with AI's capabilities."* Since Respondents 2 and 4 are both working in a low-skilled position, it is one of the factors that influence Learning anxiety. Another factor can be age. As the oldest respondent in my sample, Respondent 6 mentions that: *"I am getting old. I can try my best, but AI learns too fast."*

4.2 Industry-related findings

As suggested by Braun et al. (2006), it is better to take notes and mark coding ideas or potential coding schemes during reading through the interview data. I highlight the semantic codes in the transcripts for the convenience of reading. An extra summary table, where all the semantic codes have been put in, has also been added to each of the interview transcripts (see Appendix 2). The codes, as well as the themes, are continuously developed and defined throughout the analysis process.

I use Mural as a tool to help me with the coding process. I write these short descriptions of each code on post-it notes in Mural, for it is convenient to operate on the laptop by simply dragging the textboxes to any suitable positions. Tuckett (2005) regards the coding process as part of analysis because the data should be organized into meaningful groups. As stated in the second and third phases of the measure, during the process of collation, I figure out the similar codes which can be clustered together. Based on shared patterns or meanings, some potential themes appear. Therefore, initial codes are generated and an initial thematic map is sorted out (Figure 1). The map shows overall conceptualization of themes in the data and the relationships among them.

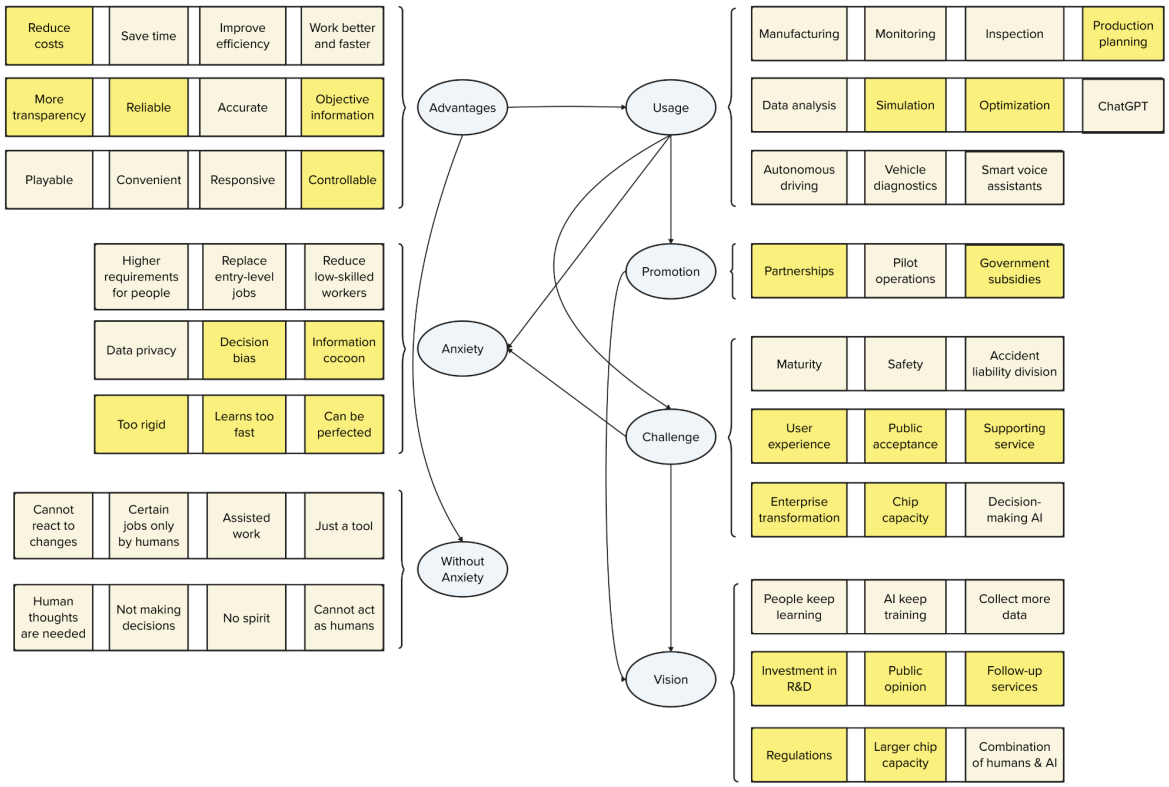

Figure 1. *Initial thematic map*

All the semantic codes are clustered and seven themes are defined: “Advantages”, “Usage”, “Anxiety”, “Without anxiety”, “Promotion”, “Challenge”, “Vision”. The codes with lighter background color are common grounds mentioned by both Chinese and German respondents. The terms highlighted are differences between the interviewees from the two sides, which is what I want to compare. The relationships among the themes can be discovered from the

codes and are shown by the arrows. In the following three findings, the meaning of the arrows will be explained:

In the Ice-breaker questions, I have asked the respondents to give an example of using AI at work. Many examples, which can be seen under the theme "Usage", are collected from the interviewees. As is shown in Figure 1, under the themes "Advantage" and "Usage", there are three rows of codes for each theme. Every row in the two themes correspond to each other respectively. AI is often used in manufacturing, monitoring, and inspection in the workshop, because it can normally work better and faster than humans while doing some tedious work. *"Production planning"* in smart factories is added by Respondent 3. Respondent 1 points out that: *"If companies need to ensure revenue, they need to reduce costs and improve work efficiency. Then AI can help."* The keyword *"efficiency"* is always mentioned in almost all the interviews, but only Chinese respondents care more about *"cost reduction"*.

In the second row, thanks to the accuracy of AI, it can be used for data analysis. As stated by Respondent 5: *"We use that for entry-level work of analyzing and classifying technical requirements."* Compared to the German respondents, the Chinese respondents think AI brings more transparency and objective information, so that is more reliable. Thus, Chinese apply more AI in data analysis and ChatGPT while German may also apply AI in simulation and optimization.

In the third row, since AI is considered to be convenient, responsive, and playable at the user experience level, AI has been widely used in smart voice assistants and reliable autonomous driving functions. As stated in 4.1, Chinese respondents hold a less anxious attitude towards AI, AI is deemed to be controllable for them. All of these advantages and applications indicate some of the codes under the theme "Without anxiety" such as *"Just a tool"* and *"Cannot act as humans"*. Since the codes in this theme are commonly agreed from both sides, I will not elaborate more in this aspect. To summarize what the advantages of AI can lead to, the first finding is put forward:

Finding 1: Advantages of AI leads to the usage of AI and people's less anxiety about AI.

As AI applications become more and more widespread, the promotion and challenge will undoubtedly coexist during the development. This statement can be proved by the logic chain from Respondent 1's example: *"Autonomous driving functions can greatly improve the users'*

car experience, making users happy and becoming a selling point. Then it can promote sales and bring economic benefits to the company." Therefore, more promotion actions may be made either by the company or by the government. Meanwhile, she also mentions the possible occurrence of challenge: *"It will cause users to have various experience problems and even security issues when using functions."*

According to the interview results, *"pilot operations"* are being conducted in both countries, such as Robotaxi in China and AI assistants of Mercedes in Germany. However, the respondents from these two countries reveal different focuses of the promotion in the interviews, which will be illustrated more in 4.3.

The challenge of the usage of AI has been discussed more during all the interviews. What is common is that the interviewees from both sides have put forward three main challenges of using AI, especially in the field of autonomous driving. They are the problems about *"maturity"*, *"safety"*, and *"accident liability division"*. These aspects can be traced in the interviews. Respondent 1 from China maintains that: "*The training of some algorithm models is not mature enough."* Respondent 5 from Germany states that: *"If the training is not enough, the decision-making of AI will not be accurate enough, and AI will be not sure whether it should transmit the information or not, which may be a risk to safety."* Thus, these challenges will lead to an accident if something goes wrong in the process, causing a subsequent difficulty of liability division, which has been mentioned by half of the respondents. Respondent 6 wonders that: *"Is it the company's responsibility or the owner's responsibility? Is it the owner's carelessness or the car's performance problem? Should the company pay the compensation or not?"* The codes in the second row under the theme "Challenge" mainly point to China's social challenges (eg. public acceptance) while the codes in the third row point to Germany's economic challenges (eg. enterprise transformation), which will also be illustrated more in 4.3.

Furthermore, a logic chain between the themes "Usage", "Challenge", and "Anxiety" can also be found. This relationship can be agreed based on the interview results. I can take the code *"Data analysis"* under theme "Usage", the code *"Maturity"* under theme "Challenge", and the code *"Data privacy"* under theme "Anxiety" as an example. People use AI to assist in data analysis. Respondent 2 notes that: *"After being constantly fed with data, AI can reach the ability to know whatever we ask, so there will be some data privacy issues."* Respondent

5 claims that: *"AI's ability needs a lot of experience data to train in order to become stronger and stronger. And it is because these large amounts of data come from different sources, privacy is another challenge."* Other codes in the three themes may not be obvious to describe the interactions, but the link can be discovered through latent meanings. Therefore, the second finding is pointed out:

Finding 2: The usage of AI results in the promotion and challenge of using AI, and the usage and challenge may cause people's anxiety about AI.

In correspondence to the interview questions design, the Industry-related questions are followed by Future-related questions, the existing promotion and challenge of using AI may lead to the vision of the future. The challenges have a greater impact on the vision. The vision can be rather treated as the improvements that people desire from different perspectives. Under the themes "Challenge" and "Vision", there are three rows of codes for each theme. Every row in the two themes correspond to each other respectively (see Figure 1). The first row shows the common ground between the Chinese and German automobile companies. The second row focuses on the Chinese side and the third row focuses on the German side.

Almost all the respondents believe his/her sector is ready for a widespread use of AI. Just like Respondent 1 states that: *"The automotive industry is an industry that is in great need of AI."* In fact, a combination of humans and AI is agreed to be expected because AI is still not that advanced to reach the decision-making level. Respondent 4 describes that: *"If we want to introduce it at the management decision-making level, it is still too risky, because the input of historical and real-time data cannot fully cover the industry prospects and interpersonal relationships between companies."* Since I have mentioned the challenge of maturity and safety, some keywords like *"keep learning"*, *"keep training"*, *"more data"*, etc. can be captured for improvements in the future. The differences will be further elaborated in the next part. The third finding is discovered:

Finding 3: The promotion and challenge of using AI form the vision of the development of AI.

As Table 1 and Figure 1 contain too much information and I would like to put more emphasis on the part about differences, I further develop the Initial thematic map into an advanced one. The Advanced thematic map shown in 4.3 should conclude all the AI-related, Industry-related, and Future-related questions.

4.3 Conclusive findings

Coding depends to some extent on whether the themes are “data driven” or “theory driven”. In the former, the themes will be determined by the data, but in the latter, the data will be approached with specific questions around which the researcher expects to code (Braun et al., 2006). In the case of this study, the Initial thematic map (Figure 1) has theory driven themes while the following Advanced thematic map (Figure 2) has data driven themes. Because in the initial coding process, I intend to code the content of the entire data set. But in the advanced coding process, I plan to identify specific and limited characteristics of the data set on the basis of the highlighted codes discovered in the Initial thematic map.

As aforementioned, the themes will be continuously developed and defined throughout the whole analysis process. Some of the themes may need to be combined, refined, or discarded. My refinement of the themes is inspired by Patton's (1990) dual criteria for judging categories, which is internal homogeneity and external heterogeneity. It means the data within a theme should cohere together meaningfully while there should be clear distinctions between themes.

Since my research question is to analyze the differences between the two countries which possess different national contexts, the change from Figure 1 to Figure 2 has been made. I leave out the codes of common grounds (see codes with lighter background color in Figure 1) in each of the new themes, but summarize the main differences (see codes with highlighted background color in Figure 1) between the respondents from the two countries instead. It shows that I combine the themes “Advantages”, “Anxiety”, and “Without anxiety” to a theme “Attitude”, because the three previous themes are a bit overlapped as they all express people’s perception of AI based on their experiences. The theme “Usage” is discarded because respondents from different backgrounds do not show much difference and the codes are rather objective. The themes “Promotion”, “Challenge”, and “Vision” are refined to simplified themes “Support”, “Challenge”, and “Expectation”. These three themes put emphasis on the external factors that affect how people think about AI. So the Advanced thematic map is more simplified and clearer, showing only the difference and telling an overall coherent story. This can be considered to be a good answer to my research question.

As is shown in Figure 2, the codes with red background color represent Chinese automobile companies and the codes with green background color represent German automobile companies. The four modified themes “Attitude”, “Support”, “Challenge”, and “Expectation” have interactions with each other and all impact “AI development”. According to the relationships which have been illustrated in the former part, the interactions between the four new themes are easy to discover, which are also shown by the arrows. People’s different attitudes toward AI lead to different methods of support in the two counties, as well as causing different challenges in various aspects. The support and challenge will further lead to corresponding expectations regarding the use of AI in the automobile industry. Figure 2 can be considered as a conclusive graph to conclude the findings of the four themes.

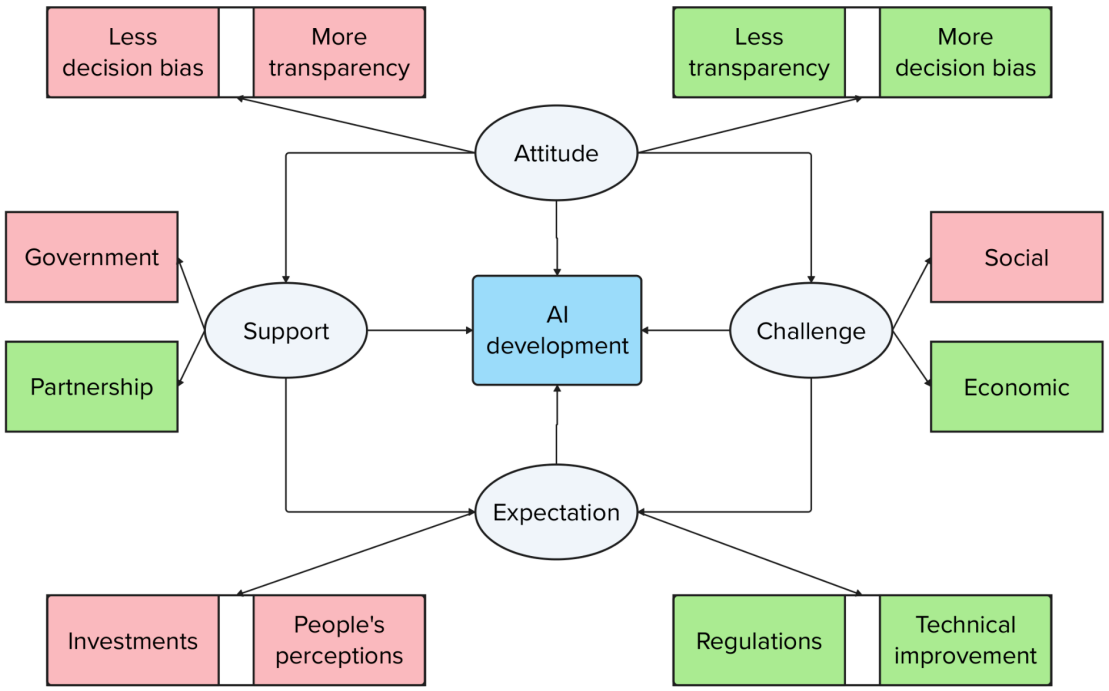

Figure 2. *Advanced thematic map*

Based on the findings mentioned in 4.1, while Chinese respondents have less anxiety about AI than German respondents, the main difference between the two groups are their perceptions about decision bias and transparency. The first finding about people’s different attitudes toward AI is summarized:

Finding 1: Chinese believe AI will cause less decision bias and more transparency while Germans believe AI will cause more decision bias and less transparency.

The following findings dig deep into the details of Finding 2 in 4.2. In the aspect of the support from the government, all the German respondents said they did not know much about the policies promoting policy. But almost all the Chinese respondents have a better understanding of the local policies. Respondent 3 affirms that: *"Some OEMs like Xiaomi and BYD have received government subsidies… The local governments help them to grow, and they are actually very willing to help, because they are the pillar industries… The government will provide tax incentives and great convenience to those high-tech companies and good projects, which is also beneficial to the government."*

What is interesting is that when we talk about the aspect of the support from the other companies, the situations of the respondents from the two countries turn the other way round. All the Chinese respondents did not mention much about this issue while the German respondents mentioned several partnerships. Although they may also not have much knowledge about how the actual partnerships go, they have inspired me to do more research after the interviews, so as to know more about how the stories work in the business world. They have mentioned the companies such as Mercedes, Bosch, and Nvidia, which can lead to further discussion in 5.1. Based on the interesting phenomena, the second finding about different methods of support is pointed out:

Finding 2: The main factor that supports and stimulates the development of AI in Chinese automobile companies is the government while the factor is partnerships for German ones.

While there is support, Chinese and German automobile companies also face various challenges. As is shown in Figure 1, the challenges Chinese companies face are mainly *"user experience"*, *"public acceptance"*, and *"supporting service"*. Regarding the public acceptance, Respondent 2 states that: *"In fact many people still do not accept autonomous driving. It sometimes has some problems. If a person uses it improperly, it may be life-threatening, which can have a bad impact on society."* It is interesting to note that one person from each side mentioned the problem of lack of supporting service in China. The words regarding this aspect can corroborate each other. When I combine the quotes from Respondent 3 and Respondent 6, I can get: *"Although Chinese automobile companies can sell the cars at a very low price, there are almost no spare parts supporting service in foreign countries, along with there's no follow-up service to keep up."*

The challenges German companies face are mainly "enterprise transformation" and "chip capacity", which focus more on business operations and partnerships. On the one hand, German automobile companies may struggle to decide the roadmap of their future development, whether to follow the trend of the times or stick to their strengths. Respondent 4 mentions that: *"I think Germany is probably still more focused on traditional vehicles, instead of electric vehicles or autonomous driving. Traditional German car companies have very strong processing and measuring capabilities… I don't think we need to give them up… and things like the buildup of charging infrastructure, and other enabling factors also will determine how the market develops. "* On the other hand, they need to find the balance between technical and economic requirements. Therefore, in the field of autonomous driving, chip capacity is a challenge to worry about. Respondent 5 says that: "AI must collect enough driving data to deal with different situations… so that enough responses can be stored. But the capacity of the chip processor can be a challenge. Whether it can store so much data or not?" Due to the different potential challenges of the two countries, the third finding is figured out:

Finding 3: During the development of AI, Chinese companies face more social challenges while German companies face more economic challenges.

Based on Finding 3, Chinese companies are more eager to improve public acceptance and services they could provide. According to the interviews, I get to know that this can be realized not only by leveraging more data, but also more investment. Respondent 1 claims that: *"Companies need to continue to invest large amounts of money in research and development to solve technical problems. And it is also necessary to respond to user feedback and maintain media public opinion. Then it leads users to buy into the technology which is still developing, and stay tuned."* Since I have mentioned the support from the Chinese government in the theme "Support", they may also provide some help to the companies for meeting the expectation of more investment. This can be also beneficial for the services that can keep up.

It is interesting to note that only one Chinese respondent mentions the importance of regulations while all the German respondents put great emphasis on the introduction of relevant policies or regulations. This was actually already evident when they attached great importance to privacy. When mentioning the privacy issues and liability division problem, all of them believe rules and regulations should be formulated. Respondent 6 underlines that:

"We need to clarify the rules and regulations, what can be touched and what cannot be touched. I'm not sure if the state has realized this problem and has taken steps in this direction." In addition to their expectations for clear regulations, they also look forward to technological advances that will allow for better use of AI. In the end, the last finding about expectations is put forward:

Finding 4: Chinese companies expect more investments and improvement of people's perceptions, German companies expect more relevant regulations and technical improvements.

5. Discussion

This research analyzes the link between people's attitudes towards AI, support and challenges during the use of AI, and future expectation. By means of analyzing the codes provided by the six respondents from China and Germany, the extent to which the AI development in these two countries is influenced by national context could be discovered, as well as the determining factors which cause the differences. In the following part, I will present the findings from the analyses and conclude with a discussion of the findings, their implications, and the limitations of the study, as well as providing the direction for future research.

5.1 Further interpretation

The main aim of this research is to investigate the role of national context in the transmission of the effects of people's attitude towards AI on AI development. According to the results in the section "Conclusive findings", the central drivers of AI development are attitudes, support, challenge, and expectation (see Figure 2). Since the attitudes have been explained in detail in 4.1, issues referring to the last three aspects are still worth discussing. More research and case studies have been conducted. In the end of each subsection, a proposition will be put forward.

5.1.1 Support

Government

According to Hertenstein and Williamson's (2018) research, they attribute the rapid growth of domestic production capacity to the investment of foreign MNCs from the advanced economies and the creation of local automobile producers in China. China aimed to establish their own "national champions" and eventually Chinese emerging market multinationals

(EMNEs) through explicit policy intervention (Thun, 2006). EMNEs internationalize their R&D activities to explore external knowledge and feed it back into the product development process (Awate, Larsen & Mudambi, 2014), along with improving products through rapid design iterations based on market feedback. Emerging industries require more policy and regulatory support than mature industries (Li & Garnsey, 2014), because they are still in the stage of finding a clear industry development direction.

In the field of automobile industry, as a latecomer, China needs to consider economic, institutional, market and social factors to facilitate technological capacity. Because of the barriers already set by the leading incumbents, latecomers must develop technological innovations and maximize local advantages (Du, Ouyang & Chen, 2017). Since China has become the world's largest electric vehicle (EV) market (The Progress Playbook, 2024), the development of the EV industry shows a successful catch-up.

The Chinese government has played a key role in driving the growth of the EV industry, supporting the R&D in the catching up process. It believes that gaining the upper hand in the field of new-energy vehicles is key to global competition (The Progress Playbook, 2024). Not only do they provide financial support to suppliers, but they also create demand that matches production capacity (Rong et al., 2017). The new policies cover various rules on charging infrastructure construction, business model value distribution, and industry standard implementation (Chen et al., 2014). Local government support, such as taxes and R&D budgets, can support latecomers to develop innovation capabilities, stimulate international cooperation and deploy resources in local markets (Malerba & Nelson, 2011). In addition, knowledge protection, which can also be regarded as a formal governance mechanism, can serve as a safeguard that promotes firms' willingness to share more sensitive and tacit knowledge during new product development, thereby driving better product innovation in exchange relationships (Zhang, Henke & Griffith, 2009). These above mentioned research results have confirmed the finding which states that Chinese automobile companies gain much support from the government.

For example, BYD has reportedly received at least 3.4 billion Euros in government subsidies to dominate electric vehicles and clean technologies. BYD’s aid increased from 220 million Euros in 2020 to 2.1 billion Euros two years later, with additional support for local battery manufacturers and rebates for car buyers (Xi, 2024). The government's massive aid reflects

China's strong commitment to dominate the EV market and clean technology. As a result, this homegrown champion surpassed Volkswagen to become China's best-selling brand and in the last quarter of 2023 overtook Tesla to become the world's largest electric vehicle producer (The Progress Playbook, 2024). These achievements demonstrate that the Chinese government's industrial policies and investments paid off.

Consumers can receive subsidies from the central and local governments while purchasing EVs, which can stimulate the sales and further motivate the R&D progress. On the basis of the "Made in China 2025" plan, China's top universities have taken the main responsibility to jointly develop next-generation electric vehicles with top automakers (Rong et al., 2017). With the support of government subsidies and policies, various new energy products have emerged and entered the market (Xiong et al., 2022). Emerging economies support local EV companies to develop diversified products and choose appropriate business models to meet the needs of different markets. However, since BYD has benefited greatly from substantial government aid and support, some concerns about the fairness of competition in the EV industry have been raised. Xi (2024) put forward that this could lead to increased competition and potential market distortions, affecting European and other global EV manufacturers.

When I look into the government support in the German automobile industry, the facts turn out that there is indeed less government support in Germany compared to China. Although the environmental bonus totaling around 10 billion Euros has been paid for around 2.1 million EVs since 2016, in light of the recently agreed budget, the German Economics Minister Robert Habeck commented, "we will phase out the environmental incentives, such as the subsidy for EVs sooner." Since the government violated constitutional debt rules by diverting 60 billion Euros earmarked for pandemic support to a climate fund, it earmarks 45 billion Euros less to the fund that supplies EV subsidies (Rho Motion, 2024). As subsidies are a key driver of EV sales, a change in EV sales patterns may occur in the short term if subsidies are phased out. Some people think Germany's electrification is well underway and the subsidy phase-out only has little impact on EV penetration in the long term (Rho Motion, 2024) while some people think the competitiveness of manufacturers will now be severely damaged (Agence France-Presse, 2023).

Partnership

Given that German goods are at a huge price disadvantage on world markets due to the high labor costs (De Massis et al., 2017), German companies should compensate for these disadvantages by creating competitive advantages through R&D. Supplier involvement in new product design and development has been identified as a key factor behind firms' innovation and performance in the supply chains. It can increase the speed and quality of new product development and reduce production costs (Wynstra, Von Corswant & Wetzels, 2010). Moreover, long-term and trustworthy relationships may reduce transaction and coordination costs, leading to the development of innovation (Mooi & Frambach, 2012). This is particularly typical in the automobile industry. German automobile companies normally adopt a tightly integrated and internally driven approach to vehicle development, placing strict and specific development requirements on suppliers and delivering them in a close two-way and long-term interaction. The companies can improve the efficiency of product development through the reuse of common parts and modular design, so as to produce a variety of derivative products with limited resources, as well as improving the flexibility in product design (Gawer & Cusumano, 2013).

For example, although Volkswagen's R&D is relatively comprehensive, large suppliers such as BOSCH or Continental are deeply involved in the development of the vehicles (Hertenstein & Williamson, 2018). Thanks to the expertise of the suppliers, they play a key role in innovation, which enables the companies to develop more efficient engines and vehicles with better performance and quality. Therefore, Volkswagen has established a close relationship with "developer suppliers" (Hertenstein & Williamson, 2018), bringing together many suppliers to develop synchronously and collaboratively, which greatly boost the development of R&D of the company. In accordance with the aforementioned "Industry 4.0" plan, Volkswagen acts as a detailed system integrator, working at the level of individual components and their interactions. Since this process requires many key elements such as professional knowledge, and managerial capabilities, it is more suitable for mainstream markets in mature markets.

A study conducted by Schwabe (2020) shows that large companies in particular want to establish development partnerships with Original Equipment Manufacturers (OEMs) in order to gain an early foothold in this new field, because large companies have the capacity and competence to establish development partnerships. However, some empirical evidence also

shows that the impact of the support from suppliers may decline after reaching a high level, because the heterogeneity of knowledge may decrease after more and more knowledge sharing. As a result, the decreased knowledge gains may limit the number of ideas for new product development (Wang et al., 2008).

In the field of AI, a partnership between Mercedes-Benz and Siemens is worth mentioning. Their cooperation means advancing digitization and automation in the automobile industry. Through this strategic alliance, both companies will leverage their respective expertise to develop innovative solutions to optimize vehicle performance, efficiency and environmental sustainability. Mercedes-Benz aims to digitize its production processes and its priority is to deliver the highest level of customer satisfaction by offering high-performance, innovative and more sustainable products. Siemens has leading automation and software solutions, which lay the foundation for the digital transformation of automobile production, bringing its expertise and technologies to this partnership (Mercedes-Benz Group, 2021). A combination of physical and virtual worlds, as well as operational technology and IT can be discovered. Therefore, with the help of innovative IoT applications, a highly flexible, efficient and sustainable automobile production can be foreseen.

Compared to the requirements of China's mid-market, some risks like over-engineered may occur. For instance, compared with Volkswagen, the system integration in Shanghai Automotive Industry Corporation (SAIC) is much looser. It requires less deep interaction with supply companies and the requirements may change mid-way during the development instead of a fixed specification (Hertenstein & Williamson, 2018).

Based on the further research results about these two aspects in the context of China and Germany, my proposition remains the same as Finding 2 in 4.3 (i.e. The main factor that supports and stimulates the development of AI in Chinese automobile companies is the government while the factor is partnerships for German ones).

5.1.2 Challenge

China

Chinese automobile companies face significant challenges in achieving public acceptance of EVs and autonomous vehicles (AVs). Research indicates that concerns about battery life, charging infrastructure, and vehicle reliability are prevalent among Chinese consumers (Wei

et al., 2020). Moreover, trust in AV technology is also a critical issue. People who hold skeptical views are because of their lack of familiarity and understanding of the technology, as well as high-profile incidents involving AVs that have been widely publicized (Luo, He, & Xing, 2022). To overcome these challenges, Li, Khajepour, and Song (2019) suggest that public education and outreach are crucial in addressing misconceptions and improving acceptance of new technologies.

Despite the fact that the Chinese government provides many subsidies for the technological development of automobiles nowadays, we have to admit that the priority to expand the use of EV or AV cannot rely indefinitely on subsidies. Lu and his colleagues (2014) put forward that with or without government subsidies, project demonstration is one of the main components for raising public awareness and stimulating a shift in the role of stakeholders, especially with respect to the need for further infrastructure investment and expanded energy supply. Strategies such as demonstrating the safety and benefits of these technologies through pilot programs, increasing transparency about safety measures, and enhancing the user experience can play a pivotal role in addressing public concerns and fostering wider acceptance (Bansal & Kockelman, 2017).

In addition to social efforts, economic and technical efforts are also indispensable. Chinese automobile companies should advance the technological reliability of EVs and AVs. Masiero et al. (2016) point out that lowering battery manufacturing costs and expanding EV charging infrastructure remain challenges to China's EV adoption. As mentioned in the example above, in spite of the central and local government subsidies, BYD's EV production and marketing are still in their infancy. Therefore, BYD is gradually seeking to deepen the technological developments needed in the industry, especially in battery production and solar energy, so as to meet consumer needs and environmental concerns. The company is also rapidly advancing the internationalization of its business to explore pioneering advantages in this emerging automobile sector in China and abroad (Masiero et al., 2016).

Germany

The German automobile industry is currently undergoing a significant transformation towards a digital and sustainable future. The combustion engine technology is gradually being replaced by electric engines. This shift will make certain parts of the existing automobile supply chain redundant (Schwabe, 2020). There will be a challenge for traditional German

automobile companies to cope with the expected market change, making a choice between traditional vehicles, electric vehicles, and autonomous driving. Companies with high dependence on combustion engine components and limited financial or R&D resources may face a high risk of long-term bankruptcy due to limited options for cooperation (Schwabe, 2020). Moreover, Germany's automobile industry has been struggling with the transition to electromobility because of a weak global economy and low demand levels. As China is one of its most important markets, it also faces tough challenges from local rivals in China (Agence France-Presse, 2023).

Hassler (2009) underlines that the goal of the firm is to achieve the most competitive and cost-effective organization as part of a wider industrial system. This involves the formulation, implementation and adjustment of strategic choices, including the organization of structures and relationships within and between firms. Hence, it is crucial to understand the external dynamics facing the company and the internal resources that determine its strategic choices. This point can be corresponding to the partnerships among German companies in the automobile field which is mentioned in the former part. On the basis of the support from partnerships, intensifying competition among suppliers may occur. They may seek to improve their position relative to other suppliers by offering innovative and higher-value products, thereby moving vertically up the value chain (Sato, 2011).

Since lead firms like Volkswagen and Daimler, and every economic actor will be impacted by competitive dynamics, such as cost pressure, innovation pressure, etc. (Coe & Yeung, 2015), actors should adopt certain strategies to deal with these dynamics. Schwabe (2020) suggests that lead firms are characterized by their ability to cater to and shape the markets of their respective end products. German automobile companies should strategically balance the competing priorities, leveraging their engineering prowess and innovation capacity to stay competitive. If they can seize the opportunity of market transformation, they will have more options and are more likely to improve their value capture trajectory (Schwabe, 2020).

For example, Volkswagen and Ford expand collaboration on autonomous technology, which is emerging as essential strategies to share the immense financial and technological burdens associated with this multifaceted transition (Volkswagen Group, 2022). Volkswagen Group (n.d.) also believes that the cost-effective and sustainable production of battery systems and the expansion of the charging infrastructure are essential for success. The shift towards

connected, intelligent and eventually autonomous vehicles will bring about wider changes in the automobile industry. Except for the economic and technological aspects, it also takes social factors into consideration, for AV will change the customer's mobility experience forever and lay the ground for new business models. Customer interest can be stimulated by the continuously improved digital features (Volkswagen Group, n.d.).

Based on the aforementioned research results about social and economic challenges for both countries, it can be revealed that both Chinese and German companies face a few social and economic challenges. At the same time, they are also looking for solutions in both aspects. The risks and opportunities of both sides are complementary. Therefore, the proposition will have a slight adjustment on the basis of Finding 3 in 4.3 (i.e. During the development of AI, Chinese companies face more social challenges while German companies face more economic challenges). The further findings in this section indicate that the focus on these two aspects is balanced for the two countries.

5.1.3 Expectation

China

The Chinese respondents expect to have more investments. This argument can be supported by a simulation conducted in Arntz and his colleagues' (2019) research. The simulation shows that firms first have to bear high investment costs and need to acquire the right skilled workers before they can achieve huge productivity gains. Schwabe (2020) also points out that it is important for companies to have access to R&D resources and capital in order to make the necessary investments in production capabilities and human resources. Therefore, productivity effects will be produced. It means technological innovation increases a company's productivity and reduces costs and prices, which in turn increases demand and output. Moreover, automation can improve quality or enable new types of products or services, which also increases demand and output (Acemoglu & Restrepo, 2018). In the case of the Chinese automobile companies, an improvement in technology and more supporting service can be foreseen. An increase in the demand for labor may thus occur, which may in turn reduce people's Job replacement anxiety.

Due to the relatively more government support and relatively less partnership, more partnerships and investments between tech companies and automakers are being expected. These collaborations are expected to accelerate the development of AI in AVs, addressing

technical challenges and enhancing consumer trust through rigorous testing and pilot programs (Bansal & Kockelman, 2017).

Germany

As aforementioned, the European Commission has proposed the AI Act, which aims to improve the quality of life of AI users by ensuring that AI systems respect fundamental rights, safety, and ethical principles (European Commission, 2024). German automakers are also preparing for the technical changes by investing heavily in EV technology and infrastructure to meet future regulatory requirements. For instance, Volkswagen Group raises investments in future technologies to EUR 73 billion (Volkswagen AG, 2020).

Nevertheless, owing to the relatively less government support and relatively more partnership with other companies, the German respondents still expect to have more regulations and technical improvements. Arntz et al. (2019) describe Germany as a developed country at the technological frontier. They believe that the main challenge is not the number of jobs, but the structure of jobs and the corresponding need for adjustments of supply to meet the changing demands within and across occupations and industries. For AVs, higher safety standards, comprehensive testing protocols, and clear liability frameworks are expected (Fraedrich, Beiker, & Lenz, 2015). These should all be clearly further regulated and the compliance and transparency in deploying autonomous systems should be highlighted.

According to the further research results about the expectations in the context of China and Germany, it is easy to discover the logic between support, challenge, and corresponding expectation for each country. As a result, my proposition remains the same as Finding 4 in 4.3 (i.e. Chinese companies expect more investments and improvement of people's perceptions, German companies expect more relevant regulations and technical improvements).

5.2 Theoretical and practical contribution

Due to the lack of data of the comparative study with European countries and Asian countries which have very different industrial structures and economies, this study can make contributions to understanding the association of cultural differences and the attitudes towards AI. Among similar literature, there is a lack of empirical evidence and academic research about the role of culture in the use of AI, this study can provide a few empirical

investigations. The results of the study represent issues that must be faced in the development of AI. More understanding towards AI may bring economic advantages to different societies (Sindermann et al., 2022). To fulfill my research goal, similar associations found in case studies from different cultures would strengthen the assumption of universally applicable associations. This study contributes to our understanding of the development of AI in the automobile industry and can be used as a reference for advanced and emerging economies to promote technological entrepreneurship.

As is shown in Figure 2, the developed framework demonstrates significant practical contributions that extend beyond this research context, offering applicability to diverse cultural settings. Since AI is an universal issue, the framework can be used to analyze other countries' conditions. Triandis (2001) emphasizes the importance of integrating both etic (universal) and emic (culture-specific) perspectives in cross-cultural research, which ensures that the framework remains relevant and functional in varied cultural contexts. This study's framework shows four important themes of AI development: Attitudes, support, challenge, and expectation. Researchers in other cultural settings can adapt this framework to analyze and address local issues, thereby enhancing its practical utility and reinforcing its contribution to the broader field of cross-cultural studies.

The results of the study will have significant implications for automobile companies and policy-makers. Decision-makers of the companies can shape pathways towards a more sustainable future in specific sectors. For example, understanding how employees perceive AI can inform human resource strategies. Companies can develop training programs to address any concerns or gaps in understanding, ensuring that employees are equipped with the necessary skills to work effectively alongside AI technologies. According to the differences in attitudes towards AI between emerging and advanced economies, companies can tailor recruitment, retention, and talent development strategies to attract and retain skilled workers in diverse geographical contexts.

Policy makers can seek for better solutions based on the international heterogeneity of impacts. This study illustrates how people's different attitudes toward AI is likely to affect the support and challenge in the field of AI and derives implications for policy makers on how to shape the future of AI. They can use the information to develop guidelines and policies that promote fairness, transparency, and accountability in the use of AI technologies in the

workplace. Under the background of globalization, multinational enterprises (MNEs) are facing a unique institutional environment in which regulatory requirements and stakeholder demands for their sustainable development are becoming increasingly strong and diverse (Wang, Wei & Wu, 2023). By comparing employees' attitudes towards AI across different economic contexts, the research can facilitate cross-cultural collaboration and knowledge sharing. A more inclusive and globally integrated approach to AI implementation in the automobile industry can be fostered.

5.3 Limitations and future research

The first limitation of this study is the currently used method. As aforementioned, such an analysis allows a rich thematic description of the entire data set, which is useful when I am investigating an under-researched area. However, some depth and complexity may be lost at the same time. Since thematic analysis does not require detailed theoretical and technical knowledge, Antaki, Billig, and Potter (2003) criticize it for its “anything goes” characteristic, given the lack of clear and concise guidelines. Therefore, the data can be described broadly. Since there is no specific guidelines for higher-phase analysis, it will be relatively hard for me to determine which aspects of the data should focus on.

Due to the flexibility of thematic analysis, I am allowed to identify the themes in a number of ways based on my preference, which may not be objective. As I have my own theoretical stances and values in qualitative research, as well as the potential factors I envisioned, it is possible for me to select, edit and deploy some codes unconsciously to support my expectations. As Braun et al. (2006) argues that there is no ideal theoretical framework for conducting qualitative research, a quantitative research is necessary to be conducted to gain relatively more objective and general views.

The second limitation of this study is the relatively small number of interviewees, which raises questions regarding the representativeness of the sample. When choosing and contacting my interviewees, I used the method of snowball sampling, where key informants or interviewees were asked to recommend people who played an active role for another interview. The recommended person and the informant are probably familiar with each other and most likely work in the same department or related departments. That is the reason why the interviewees do not cover as many different departments in the companies as I imagined

before conducting the interviews. Since this study mainly focuses on the Technology development and Manufacturing departments, though they are undoubtedly the sectors that are greatly affected by AI, it would be nice to get more interviewees from other departments involved for future research. As people who work in different departments, such as marketing, IT, etc. may have different experiences of using AI at work, more perspectives and perceptions can be included.

The limited sample size may not capture the full diversity of experiences and perspectives present within the broader population. Patton (2002) notes that qualitative research often relies on small, non-random samples, which can result in findings that are not easily generalizable. This limitation is further compounded by the possibility that the interviewees' experiences may not be entirely reflective of those in similar contexts, leading to potential biases in the data. The specific experiences and perspectives captured in this study may not represent the wider population's diversity. To address these concerns, future research should consider employing a more selective approach to participant recruitment, ensuring a broader and more diverse sample. Additionally, incorporating quantitative methods as mentioned before could provide a more comprehensive understanding of the phenomena under study, allowing for the verification and generalization of findings through statistical analysis (Creswell, 2008). This mixed-methods approach can enhance the robustness and validity of the research outcomes, as well as the generalizability and applicability across different settings.

Furthermore, as several examples both from China and Germany have been provided in 5.1, more research can be conducted at a company-level. It can still follow the route of a cross-country study as this research, providing a more in-depth analysis of the company's performance in both its home and foreign markets. The influence factors can include the factors discovered in this study, such as government subsidies, partnership, social and economic impacts, etc. For instance, further research can further analyze BYD’s investment in foreign markets and its infrastructure expansion

Lastly, at the individual level, a limitation of this study is the challenge associated with accurately analyzing the personality traits of interviewees, despite their significant impact on the research outcomes as I mentioned in 2.2. Personality is a complex and multifaceted construct that influences individuals' responses and behaviors in various contexts (McCrae &

Costa, 1997). In particular, the openness of personality will greatly affect a person's attitude towards AI. The inability to comprehensively assess and incorporate these traits into the analysis may result in an incomplete understanding of the underlying dynamics at play. This limitation is particularly relevant given that personality can affect participants' perceptions and experiences, potentially introducing biases or variability that are difficult to control for (John & Srivastava, 1999). To address this issue in future research, it would be nice to integrate validated personality assessment tools, such as the Big Five Inventory (BFI) and MBTI test which are quite popular nowadays, into the data collection process. This approach would allow for a more nuanced analysis of how personality traits interact with other variables under study. The personality assessment can also be combined with the selectivity of the participants as mentioned before. This is the reason why it is also interesting to employ a mixed-methods design that combines qualitative interviews with quantitative personality assessments. A richer and more comprehensive dataset can be expected, so that the validity and depth of the research findings can be enhanced.

5.4 Conclusion

There are three important elements of this study: AI, national contexts, and automobile industry. The Integrated fear acquisition theory regarding AI anxiety set the foundation of the whole research. Two plans called "Made in China 2025" plan and "Industry 4.0" plan lay the foundation of the cultural difference. Displacement effect and Income effect can be in accordance with the choice of the study to focus on the automobile industry. In accordance with institutional theory, social cognitive theory, adoption and diffusion theories, potential factors of cultural differences which influence people's attitudes towards AI have been put forward.

This paper employs a qualitative method, using a pair-wise comparison of case research on German and Chinese automobile companies. Several semi-structured interviews were conducted with workers who have similar working positions from both sides, asking how they expect the impact of the use of AI in the industry. The main interview questions are divided into AI-related, Industry-related, and Future-related questions. This study provides empirical perspectives at the individual level, but the results will be divided by nationality to find similarities and differences between different countries, so as to complete the cross-country research. In doing this, the study contributed to filling a gap in qualitative

empirical data about different attitudes towards AI due to cultural differences between European and Asian countries which possess advanced and emerging economies respectively.

This study sheds light on the main effect of people's attitudes toward AI on the development of AI, as well as the effect caused by the potential factors. A thematic analysis has been conducted to analyze the collected data and the findings have gone through three steps in order to be iterated.

First, from the perspective of AI-related questions, Chinese respondents show less anxiety about AI than German respondents. All the respondents hold a positive attitude towards the application of AI, even though they all believe that AI will replace some jobs and may violate privacy. German respondents think AI will cause bias in decision making and may lead to lack of transparency while the Chinese respondents think contrarily.

Second, after including the perspective of Industry-related questions and clustering the codes during thematic analysis, the relationships among the themes can be discovered. Advantages of AI leads to the usage of AI and people's less anxiety about AI. The usage of AI results in the promotion and challenge of using AI, and the usage and challenge may cause people's anxiety about AI. The promotion and challenge of using AI form the vision of the development of AI.

Third, after involving the perspective of Future-related questions to conclude the findings and focus more on the differences between the two national contexts, an advanced and clear thematic map has been developed. The results show that Chinese believe AI will cause less decision bias and more transparency while Germans believe AI will cause more decision bias and less transparency. The main factor that supports and stimulates the development of AI in Chinese automobile companies is the government while the factor is partnerships for German ones. During the development of AI, Chinese companies face more social challenges while German companies face more economic challenges. Chinese companies expect more investments and improvement of people's perceptions, German companies expect more relevant regulations and technical improvements.

Despite the low number of interviewees, these findings were relatively consistent and were supported by further evidence from literature. In the end, I can answer the research question

of this study. Different perceptions of decision bias and transparency are the main factors of cultural differences that influence people's attitudes towards AI. Both German and Chinese automobile companies are facing social, economic, and technical challenges. Furthermore, since Chinese firms gain more support from the government and German firms gain more support from partnerships, they have different expectations for the future development of AI. They would like to put emphasis on the investment and regulations respectively.

6. Reference

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7. Appendix

7.1 Interview questions design

<table>
<tr><td>1. Interviewee</td><td></td><td rowspan="5">Things to consider:</td></tr>
<tr><td>2. Gender, age</td><td></td></tr>
<tr><td>3. Nationality</td><td></td></tr>
<tr><td>4. Working Position</td><td></td></tr>
<tr><td>5. Department</td><td></td></tr>
<tr><td colspan="2">Questions</td><td>Answers</td></tr>
<tr><td colspan="2">Ice-breaker
1. How long have you been involved in the automobile industry?
2. What is your role within the automobile industry? (sector)
3. Have you ever used AI at work?
4. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)

AI-related question
1. Generally speaking, do you have a positive or negative view of AI?
2. Do you think AI is stealing jobs?
3. Do you think you are able to learn well during the application of AI?
4. Do you think AI is violating privacy?
5. Do you think AI will cause bias in decision making?
6. Do you think AI may have the same level of consciousness as humans?
7. Do you think AI may lead to lack of transparency?
8. Do you think AI makes people perform different behaviors?
9. Do you think AI will cause existential problems for humans?

Industry-related question
1. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile</td><td>Job replacement anxiety
Learning anxiety

Privacy violation anxiety
Bias behavior anxiety

Artificial consciousness anxiety

Lack of transparency anxiety

Against ethics anxiety

Existential risk anxiety

[corresponding to potential factor in</td></tr>
</table>

industry? 2. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI) Future-related question 1. Do you think your sector is ready for a widespread use of AI? 2. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used) Closing 1. Is there anything else you would like to add regarding the impact of AI on the automobile industry? 2. Any recommendations or insights? Thank you	research proposal: policies, media] [corresponding to potential factor in research proposal: social challenge, economic challenge] [corresponding to potential factor in research proposal: policies, challenge]

7.2 Interview transcripts

Interview 1

1. Interviewee	Yichen	**Things to consider:** L1-L5 level functions in the autonomous driving industry
2. Gender, age	Female, 32	
3. Nationality	Chinese	
4. Working Position	Client software product engineer	
5. Department	Technology development	

Questions	**Answers**
Ice-breaker 10. How long have you been involved in the automobile industry? 11. What is your role within the automobile industry? (sector) 12. Have you ever used AI at work? 13. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)	1. 8 years 2. autonomous driving operation department, client software product engineer 5. Yes, ChatGPT: pictures, tables, simple articles 6. Voice assistants: quick completion, playability, emotion and soul, reliability
AI-related question 5. Generally speaking, do you have a positive or negative view of AI? 6. Do you think AI is stealing jobs? 7. Do you think you are able to learn well during the application of AI? 8. Do you think AI is violating privacy? 14. Do you think AI will cause bias in decision making?	1. Positive Improve efficiency and save time, higher ROI, limited time 2. Yes Replace repetitive and mechanical jobs, machines can be better and faster 3. Yes No worries for current level, have enough ways to control Many jobs can only be done by humans: emotional intelligence and social interaction 4. Yes, but can accept Camera and recording functions, algorithms of some apps 7. Yes, depending on differences in cognitive levels Clear framework and standard for judging things vs. Change original

15. Do you think AI may have the same level of consciousness as humans? 16. Do you think AI may lead to lack of transparency? 17. Do you think AI makes people perform different behaviors? 18. Do you think AI will cause existential problems for humans?	judgment standards 8. No, may be close in the future Environmental elements, a process of cultivation, not 100% imitable, without soul and emotion 9. No higher degree of transparency, fixed standards, more controllable 10. No No worries for current level 11. No The reduction of some jobs, principle of survival of the fittest, find ways to improve your own irreplaceability
Industry-related question 3. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?	1. Driving: pilot operations of Robotaxi Hindering: Not allow mass production of L3-level functions, not mature enough, no clear accident responsibilities
4. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI)	2. Technical level and user level Problem of maturity, experience problems, security issues (Continue to invest in R&D, respond to user feedback, maintain media public opinion)
Future-related question 3. Do you think your sector is ready for a widespread use of AI?	1. Yes In great need of AI: vehicle manufacturing, intelligent car control, autonomous driving Production: cost reduction and efficiency improvement, ensure revenue User experience: smart voice assistants, reliable autonomous driving functions, promote sales, bring economic benefits
4. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used)	2. Autonomous driving technology: reduce long-distance driving fatigue, change the world's transportation methods
Closing 3. Is there anything else you would like to add regarding the impact of AI on the automobile industry? 4. Any recommendations or insights?	

Transcript:

H: How long have you been involved in the automobile industry?
Y: I started working in this field after graduation, which has lasted about eight years.
H: What is your role within the automobile industry?
Y: I am in the autonomous driving operation department and my position is client software product engineer.
H: Have you ever used AI at work?
Y: I have used it, mostly **ChatGPT.** I just need to describe the effect I want to achieve, such as **pictures, tables, simple articles**, and it can help me generate them. Our company itself also has relevant departments that specialize in this function, and those related positions will have a deeper understanding of this aspect.
H: Is there any example related to your work showing that AI has improved efficiency or productivity?
Y: What I feel deeply about are products such as **voice assistants**. Our company's car voice assistant has recently made an iteration that can support GPT. For users, in addition to basic smart car control functions, they can be **quickly completed through voice commands**. It can also greatly improve its **playability**, just like an encyclopedia, it can answer various questions, giving it more **emotion and soul**, making it a more **reliable** partner for users.
H: So generally speaking, do you have a positive or negative view of AI?
Y: I think it is positive, because AI can greatly help us **improve efficiency** and **save time** in daily life or work. Especially in fast-paced cities, efficiency is very important. Everyone is pursuing **higher ROI** and is more willing to invest **limited time** in core tasks that require concentrated brain power.
H: Do you think AI is stealing jobs?
Y: I think yes.
H: And why?
Y: I believe everything is a **double-edged sword.** Some of the **repetitive and mechanical jobs will be replaced** by machines because machines can do it **better and faster**.
H: Although they can be better and faster, do you think you are able to learn well during the application of AI?
Y: Based on my actual work experience, I think we **can handle it now**. To be honest, the **current level** has not caused me to have such worries. Once humans have created AI, they **have enough ways to control** it.
H: What do you mean by "control"?
Y: At the current level, still **many jobs can only be done by humans**, but not AI. For example, work relies heavily on "**emotional intelligence**" and "**social interaction**". They cannot be accomplished by AI.
H: Do you think AI is violating privacy?
Y: It is possible. Because of some **camera and recording functions**, the **algorithms of some apps** like Xiaohongshu, Douyin, Taobao, may identify what contents I like to browse based on my chat contents and push them to me. It depends on the **individual's sensitivity to information privacy**. I personally **can accept** it, but some people may not.
H: Do you think AI will cause bias in decision making?
Y: It's also possible. I think the impact on different individuals may be different, **depending on differences in cognitive levels**. Some people have a **clear framework and standard for judging things**, and will consider the logical consistency of things to make evaluations.

But some people may be deeply affected and **change their original judgment standards**. For example, the contents pushed by Douyin may depict what a certain country is like. For those people, they have not actually seen it, but they will believe the contents and form a stereotype.
H: Do you think AI may have the same level of consciousness as humans?
Y: I think the levels **may be close in the future**, but it **won't be exactly the same**. Because the level of human consciousness comes from many **environmental elements,** and there is **a process of cultivation**. From the age of 10 to the age of 30, you have gone through school education and also improved your abilities during social activities. This is **not 100% imitable** by AI. And even if it can be imitated, I don't think it makes sense. **Without soul and emotion**, it cannot be called a human being.
H: Do you think AI may lead to lack of transparency?
Y: Currently, I don't have many worries from this aspect. Instead, I feel like AI may bring a **higher degree of transparency**, because things done by machines have **fixed standards** and are **more controllable**.
H: Do you think AI makes people perform different behaviors?
Y: I also **don't have worries about this**. I can't think of any scenarios that would cause this problem. What do you mean by this question?
H: I mean people may have different feelings for AI, or even love, just like we've seen from the movie "Her". Then it will lead to different behaviors.
Y: Just like what I've said before, it may happen in the future. But based on the **current technique level**, I don't think we need to worry about that.
H: Do you think AI will cause existential problems for humans?
Y: The current existential problem that can be associated with it is **the reduction of some jobs**, but I think this is not a problem. Society, just like nature, also follows the **principle of survival of the fittest**. Those whose abilities cannot keep up with the development of the times will naturally be eliminated. So it is more important to **find ways to improve your own irreplaceability**.
H: Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?
Y: Most of what I feel is **driving characteristics**. For example, some cities in China have successively opened **pilot operations of Robotaxi**.
H: How about the obstacles?
Y: It may also exist. In the autonomous driving industry, the law currently does **not allow mass production of L3-level functions** because the technology in this area is **not mature enough** and the **accident responsibilities** in this area have not been clearly defined. Generally speaking, the regulations are in a state of advancement and will be gradually released **based on the maturity** of the technology.
H: Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector?
Y: It is also the **problem of maturity**. The training of some algorithm models is not mature enough, so that it will cause users to have various **experience problems** and even **security issues** when using functions.
H: So how should the company manage that?
Y: I think companies need to **continue to invest** large amounts of money in research and development to **solve technical problems**. And it is also necessary to **respond to user feedback** and **maintain media public opinion**. Then it leads users to buy in the technology which is still developing, and stay tuned.

H: Since you have talked about the technical aspect, how about other aspects like social or economic?
Y: What I feel is only the **technical level and the user level**. The social and economic aspects can be too grand to be perceived.
H: Do you think your sector is ready for a widespread use of AI?
Y: I think so. The automotive industry is an industry that is **in great need of AI**. Whether it is **vehicle manufacturing** at the production level or **intelligent car control** and **autonomous driving** at the user experience level, AI is already being fully applied in many aspects, and there is also continuous investment on AI. I think at the **production level**, this comes from **cost reduction and efficiency improvement**. If companies need to **ensure revenue**, they need to reduce costs and improve work efficiency. Then AI can help. At the **user experience level**, **smart voice assistants** and **reliable autonomous driving functions** can greatly improve the users' car experience, making users happy and becoming a selling point. Then it can **promote sales** and bring **economic benefits** to the company.
H: What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future?
Y: I think it is the **autonomous driving technology**. At present, in the scenarios of highways and urban expressways, autonomous driving is an auxiliary function. We actually call it "intelligent driving" or "automatic assisted driving". It still requires manual attention and takeover by users, so the word "autonomous driving" cannot be used yet.
H: So what will happen if the word "autonomous driving" can be truly used?
Y: It can really help users **reduce long-distance driving fatigue**. In the future, when the real autonomous driving function can be mass-produced and implemented on the road, **the world's transportation methods may change**. For example, there will be no private cars, but shared autonomous driving vehicles. Everyone will use this kind of transportation when going out because they don't need to drive by themselves.

Interview 2

1. Interviewee	Luo	**Things to consider:** Xiaomi SU7, fully automated workshop
2. Gender, age	Female, 27	
3. Nationality	Chinese	
4. Working Position	Logistics specialist	
5. Department	Supply chain management	

Questions	**Answers**
Ice-breaker 1. How long have you been involved in the automobile industry? 2. What is your role within the automobile industry? (sector) 3. Have you ever used AI at work? 4. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)	1. 3 years 2. Supply chain management department, logistics specialist 3. Yes, ChatGPT: understand some trends and market information, summarize some information Work better and faster than humans 4. Autonomous driving, audio-video entertainment equipment, fully automated workshop (Xiaomi SU7), logistics and technical manufacturing
AI-related question 1. Generally speaking, do you have a positive or negative view of AI? 2. Do you think AI is stealing jobs? 3. Do you think you are able to learn well during the application of AI?	1. Positive Be the general direction in the future, will flourish We must trust, but not retreating and avoiding 2. Yes Reduce low-level labor, but higher quality of the people will be hired Higher requirements for people: understand the technology, be able to use some AI-related things Inter-disciplinary talents: know more and be more comprehensive 3. No Will never catch up with it, but need to learn how to use AI Learn specific prompt words: AI can quickly understand what I want to do The more AI you use, the more efficient you can be 4. Maybe

4. Do you think AI is violating privacy?	AI being constantly fed with data, use the data again and put them into its database Data privacy issues: public information or data from other channels? Private things of the company? If not authorized, will lead to privacy infringement issues Everything you express will be used by AI Depends on the size of the company: large companies have internal AI, small companies have small data size
5. Do you think AI will cause bias in decision making?	5. No Not good at making decisions, AI just assists us, use AI as a reference Can't be as responsive as a human (eg. autonomous driving)
6. Do you think AI may have the same level of consciousness as humans?	6. No Difficult to be completely the same as a human, have deviations, can only be a tool Humans: reflexes and experiences from childhood to adulthood AI: cold data, cannot react to changes or sudden situations
7. Do you think AI may lead to lack of transparency?	7. No AI will not conceal information, will not do anything intentionally, behavior is fair and just, open and transparent, provides objective information
8. Do you think AI makes people perform different behaviors?	8. Maybe, depends on how individuals treat AI If rely too much on AI, may lose yourself
9. Do you think AI will cause existential problems for humans?	9. Maybe Be created to eliminate some tedious work, threaten the jobs We need to learn how to use AI
Industry-related question	
1. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?	1. Driving China is actively promoting many softwares similar to ChatGPT, to make China's AI atmosphere better
2. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI)	2. Social aspect: Autonomous driving: difficulty in public acceptance, may be life-threatening if be used improperly (need to use data to convince the

	public) Economic aspect: double-edged sword, reducing costs and increasing efficiency In the context of consumption downgrade, AI is still more recognized and people are willing to spend more energy and money to develop this
Future-related question 1. Do you think your sector is ready for a widespread use of AI?	1. Yes A lot of low-skilled labor, AI has a great impact on the industry Only by embracing the most advanced technology can you make your business better
2. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used)	2. Manufacturing: robots in workshops Autonomous driving: AI assistants All its applications are based on humans now
Closing 1. Is there anything else you would like to add regarding the impact of AI on the automobile industry? 2. Any recommendations or insights?	

Transcript:

H: How long have you been involved in the automobile industry?
L: About three years.
H: What is your role within the automobile industry?
L: I am in the supply chain management department and my position is logistics specialist.
H: Have you ever used AI at work?
L: Yes, I often use **ChatGPT.** As you know, we used Baidu before, but now we use ChatGPT to **work faster**. I will use AI to **understand some trends and market information**. I can ask it to help me **summarize some information** and it can do much **better and faster than humans**. If we do it manually, we will need to think and search for a long time, but for ChatGPT, it only takes a few seconds.
H: I can totally understand that AI has improved your working efficiency. Is there any example related to the whole industry showing that AI has also improved efficiency or productivity?
L: When it comes to the combination of the automobile industry and AI, the first thing that comes to my mind is **autonomous driving**. In addition, there may be some **audio-video entertainment equipment** that can be related to AI.
H: How about in the field of logistics?
L: **Xiaomi SU7** is quite popular nowadays. Every part of the car was assembled by their company, even the appearance of the car is also made by themselves. They built a car

factory belonging to Xiaomi, instead of just selling technology. I have visited their workshop, **the whole workshop is fully automated** and is very large. It is basically an **unmanned workshop**. The **logistics and technical manufacturing** inside are all done by AI.
H: Generally speaking, do you have a positive or negative view of AI?
L: I have a **positive** view. I believe the rise of the AI industry will definitely **be the general direction in the future**, which **will flourish** for many years. So I think we **must trust** this industry. Everything we have possessed nowadays is also the things that we thought were very difficult at the beginning, but in fact, we have come through. So I think we should treat some things **positively instead of retreating and avoiding** them.
H: Do you think AI is stealing jobs?
L: What is **reduced is low-level labor**, but more people who can **use intelligent software or a complete set of IoT devices will be hired**. So **fewer people** are hired, but the **quality of the people hired is also higher**. For example, if we want to recruit a workshop manager, a high school degree may have been enough in the past, but now at least a bachelor's degree or above is required for management, which means that all talents have been upgraded. They need to not only **understand the technology**, but also be **able to manage the robots** in the entire huge workshop. They should know how to use various software and hardware, as well as having some business experiences. In recent years, people who get hired are no longer just doing some physical work, but really **being able to use some AI-related things**.
H: So it seems like what we need more is inter-disciplinary talents?
L: Yes exactly, **inter-disciplinary talents** are very important. This is completely different from before. People are expected to be agile and smart, but not just experienced. And also, because the direction is not as vertical as before, in the present context, people should **know more and be more comprehensive**.
H: Do you think you are able to learn well during the application of AI?
L: **No, you will never catch up with it**. So what we humans should do is not to catch up with AI, but to **learn how to use AI** in the process. Many positions are recruiting people who can use AI now, and it is not only in our automobile industry, but also for many other industries. I believe **the more AI you use** in your work, **the more efficient you can be** at work.
H: Can you maybe elaborate more about “how to use AI”? Is there any specific ability?
L: If you ask more questions in ChatGPT, you will have some **specific prompt words**, such as "translate", "help me generate", etc. Every time I ask ChatGPT to help me do something, I will input a prompt word, and these prompt words are things that need to be learned. I have to learn what kind of prompt words I should write so that **AI can quickly understand what I want to do**. For example, if I want to make a table, what should I input to get a certain effect that can be achieved at once, instead of describing again and again. This is actually really worth learning. There are some positions now recruiting prompt word engineers or application engineers, who can be the intermediary between people who don’t know how to use AI and AI. They will understand both parties and ultimately complete the task.
H: Do you think AI is violating privacy?
L: **It may exist**, because first of all, a lot of information will be fed to AI, so that it can do some training. After **being constantly fed with data**, AI can reach the ability to know whatever we ask, so there will be some **data privacy issues**. Where does its data come from? If it is **public information** that can be found on the market, it cannot be considered as an invasion of privacy, but the company may need to pay some copyright fees and data usage fees. But if the company obtains **some data from some other channels**, and these

channels are **not really authorized to them**, then they will be involved in **privacy infringement issues**. Also when you are using ChatGPT, you need to notice that everything you told ChatGPT will be entered into its database for retraining, but this is authorized and does not involve privacy problems. Anyway, you must know that **everything you express will be used by it**.
H: So for example, if you provide a file with company data to ChatGPT and ask it to generate a document, then it is actually suspected, right?
L: Yes, especially if these are very **private things of the company**. If you give them to ChatGPT, it may **use them again and put them into its database**. But this is more about personal usage and behavior.
H: Does your company have clear regulations about this, such as what cannot be done with AI or ChatGPT?
L: Not really, because the privacy problem caused by AI is unlikely to lead to big problems. It is true that these things are in a gray area, but it also **depends on the size of the company**. Those **large companies may not use external AI**, such as Alibaba, ByteDance, and Tencent, they all have their own AI. Their data is only for their internal use, otherwise the data will be uploaded for secondary use. **Small companies** may not need to have specific internal AI because of their **small data size**.
H: Do you think AI will cause bias in decision making?
L: AI is **not really good at making decisions** for you, it **just assists us** when we make decisions.
H: Yeah we need to decide the general direction by ourselves, and then **use AI as a reference**?
L: Yes, we can take the combination of AI and cars in **autonomous driving** as an example. You can't have no driver in the car, AI can only be used to assist driving, and no one dares to completely free their hands. It is in a specific environment, such as on the highway, where we don’t have a complicated driving environment, then you can free your hands or even take a short nap. But if you drive on the urban streets, the driving environment can be very complicated. Those online promotional videos only show that it can be done, but it doesn't work every time. AI is built in some scenarios, it **can't be as responsive as a human**.
H: Then it can lead to my next question, do you think AI may have the same level of consciousness as humans?
L: It is **difficult for AI to be completely the same as a human**, it will definitely **have deviations**. AI cannot have the same consciousness as humans. This is because humans have different **reflexes and experiences from childhood to adulthood**. AI relies more on **cold data** to make judgments. It **cannot react to changes** in the environment or **sudden situations**. It cannot become a human and **can only be a tool**.
H: Do you think AI may lead to lack of transparency?
L: AI **will not conceal information**, because AI has no consciousness as I said before, so it **won’t do anything intentionally**. Its **behavior is fair and just**, and it won’t be jealous or envious as humans. I think everything it does is **open and transparent**, unless it is controlled by humans. AI only **provides objective information** and cannot help us choose.
H: Do you think AI makes people perform different behaviors?
L: I think it **depends on how individuals treat AI**. If you **rely too much** on AI, you may **lose yourself** and have different behaviors.
H: Do you think AI will cause existential problems for humans?
L: Maybe, since AI was **created to eliminate some tedious work**, people who originally made a living from **these jobs may be threatened**. But there is no way to avoid this,

because human progress has come step by step in this way. We can only try to make ourselves better and **learn how to use AI, rather than eliminate AI**.
H: Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?
L: As far as I know, we have **many softwares similar to ChatGPT**, which **China is actively promoting**, such as Baidu's WenxinYiyan and Alibaba's TongyiQianwen. These are all mobile phone softwares that need to be filed and China is still very active in promoting these things.
H: Are there any clear policies to promote that?
L: I am not sure about the specific laws and regulations, but there should be some. The active promotion is to **make China's AI atmosphere better**, because China's AI is indeed still lagging behind the United States.
H: Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector?
L: **Autonomous driving** is still a challenge from the **social aspect**. The **difficulty in getting the general public to accept** autonomous driving is how to promote it, because in fact many people still do not accept it. Autonomous driving sometimes has some problems. If a person uses it **improperly**, it **may be life-threatening**, which can have a bad impact on society.
H: Then how will you promote to make people accept more?
L: The first is we **need to use data** to elaborate. The proportion of accidents caused by autonomous driving is smaller than that caused by humans. Autonomous driving does not account for a large proportion of car accidents. It is just that the impact will be greater after this incident. In the future, we really need to solve the problem of acceptance.
H: How about the economic challenge? Does it bring any change?
L: It's hard to say, the recent economy is not very good. But even under this circumstance, the **AI industry is still relatively prosperous**, which means that everyone can accept a **consumption downgrade** referring to food, drink, housing, and transportation. But in terms of AI, there are more investments, which shows that **AI is more recognized and people are willing to spend more energy and money to develop this**. For large enterprises and companies, AI will play a role in **reducing costs and increasing efficiency**, because it can save a lot of labor, but also create some jobs to improve efficiency. There are some positive effects, but also many challenges. I feel like this is a **double-edged sword**.
H: Do you think your sector is ready for a widespread use of AI?
L: I think so. The automobile industry has **a lot of low-skilled labor**, so **AI has a great impact on the industry**. I think **only by embracing the most advanced technology can you make your business better**. That's the **only way which must be passed**.
H: What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future?
L: I think AI will be mainly used for **manufacturing**, like **robots in workshops**, and also some **AI assistants in cars**, which is for **autonomous driving**.
H: Is there any area where AI should not be used?
L: There should be **nothing that cannot be used**. Because the current situation is that AI does not have such a big negative impact. People's fear of AI may come from some movies, which show that AI will have its own thinking, but in fact it **has not reached such an advanced level yet**. So it is actually we who want to use AI, but not we don't want to use AI and AI is already there. **All its applications are based on humans**.

Interview 3

1. Interviewee	Zhenyu	**Things to consider:** Government subsidies, tax incentives for companies like Xiaomi and BYD Tesla: has no patents, free to the public
2. Gender, age	Male, 50	
3. Nationality	Chinese	
4. Working Position	Workshop manager	
5. Department	Manufacturing	

Questions	**Answers**
Ice-breaker	
1. How long have you been involved in the automobile industry?	1. 28 years
2. What is your role within the automobile industry? (sector)	2. Product management department, workshop manager
3. Have you ever used AI at work?	3. Yes, smart factories
4. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)	4. Collect the standardized data, know the capacity of each production line and the overall output of the workshop Use AI to calculate the working hours and number of workers, compare the real-time data with the standard, monitor the performance of the equipment
AI-related question	
1. Generally speaking, do you have a positive or negative view of AI?	1. Positive Convenience to life, no need for recalculation, reduce time-consuming and laborious work
2. Do you think AI is stealing jobs?	2. Yes Improve efficiency and strengthen monitoring, rely on systems instead of experiences Number of staff in the workshop will be reduced
3. Do you think you are able to learn well during the application of AI?	3. Yes, at least for now attend some training, improve myself, adapt to the environment
4. Do you think AI is violating privacy?	4. Maybe Need to set permissions, just need to do your own things
5. Do you think AI will cause bias in decision making?	5. No If the data collection is accurate and consistent with the actual situations Use AI to discover the flaws, but adjustments should be made by ourselves

	We haven't reached the level to let AI make a decision
6. Do you think AI may have the same level of consciousness as humans?	6. No Not that smart, AI's feedback depends on the quality of the information we gave
7. Do you think AI may lead to lack of transparency?	7. No Increase transparency: respond in time, reflect the status truthfully
8. Do you think AI makes people perform different behaviors?	8. No
9. Do you think AI will cause existential problems for humans?	9. No, but not sure about the future
Industry-related question	
1. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?	1. Driving Government subsidies, tax incentives, and great convenience eg. Xiaomi and BYD: pillar industries of the city, very large industry chain, the government would expect economic development Chinese companies: copy the software from Tesla, use local suppliers, buy the parts at very low prices, and sell cars at very low prices to foreign countries
2. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI)	2. Social aspect: Difficult to determine the responsibility if accidents occur Economic aspect: Difficult to export: no spare parts supporting service in foreign countries (Build factories abroad)
Future-related question	
1. Do you think your sector is ready for a widespread use of AI?	1. Yes, prerequisite is the regulations AI is always faster than humans, humans need to control AI to do certain things Make better use of AI: corresponding institutions, norms, and agreements
2. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used)	2. Inspection: reduce the defect rate, rely on machine accuracy Compare products, labor and revenue: connect all production data for analysis (eg. ERP, BI)
Closing	
1. Is there anything else you would like to add regarding the impact of AI on the automobile industry?	

2. Any recommendations or insights?	

Transcript:

H: How long have you been involved in the automobile industry?
Z: 28 years.
H: What is your role within the automobile industry?
Z: I am in the Product management department and I am the workshop manager.
H: Have you ever used AI at work?
Z: Yes, we are now promoting **smart factories**
H: Can you elaborate more about this smart factory?
Z: We first **collect the data** of each piece of equipment. Now every equipment in our factory has an interface and **data is standardized**, so we can **know the capacity of each production line and the overall output of the workshop**. We can then input the data, such as the demand for different products and how much production is required, AI can help us to **calculate the working hours** required for the product, and the **number of workers** can also be reasonably arranged. Based on this, we can **compare the real-time data with the standard**. Improvements can be made in time while production is in progress. We can also **monitor the performance of the equipment** from Kanban. How is the input and output? Whether it is within the normal range? Especially when we have new products, the equipment needs to be monitored, and the time and quantity should be set.
H: Generally speaking, do you have a positive or negative view of AI?
Z: **Positive**. It has brought **convenience to life**. The data does **not have to be recalculated**. Because there are so many changes happening every day. Unlike the previous monthly and weekly plans, it is impossible to recalculate the data every day. **Manual calculation is time-consuming and laborious**.
H: Do you think AI is stealing jobs?
Z: Because we are now in early stages, even one or two more staff have been added to supervise the test. But since AI can **improve efficiency and strengthen monitoring**, the **number of staff in the workshop will be reduced** in the future.
H: How was the personnel placement before the existence of AI?
Z: In the past, we **relied on experience**, but now we **rely on systems**. We had people for inspections before, but no one for monitoring. If we don’t have such a device, it is completely based on human experience for observation. Only when there is a problem with the product can we make a judgment of the equipment.
H: Do you think you are able to learn well during the application of AI?
Z: I guess so, **at least for now**. I want to use it and I have to **attend some training**, otherwise I will be eliminated. At least I need to have a vision and **improve myself**, otherwise I can't **adapt to the environment**.
H: Do you think AI is violating privacy?
Z: Maybe, but you **need to set permissions**. Some people edit, some view, some collect, some integrate, and finally a report will be generated. You **just need to do your own things** and can't see the data without permission.
H: Do you think AI will cause bias in decision making?
Z: **If the data collection is accurate and consistent with the actual situation**, there should not be a big problem while analyzing. We **use AI to discover the flaws** in the whole

operation and **make adjustments by ourselves**. The main thing is to find out what is not done well and make improvements. We **haven't reached the level to let AI make a decision**. At most, it would say that based on the existing data, it is impossible to schedule production, which means there must be a gap. We need to add more production lines or equipment or personnel, or extend the production time.
H: Do you think AI may have the same level of consciousness as humans?
Z: No, it's **not that smart**. What AI feeds us back largely **depends on the quality of the information we give it**.
H: Do you think AI may lead to lack of transparency?
Z: I think it will actually **increase transparency.** It will even make it clearer. It can **respond in time** and **reflect the status truthfully**. Otherwise, there is something wrong with the program. Based on our analysis during the production, we can even predict the future.
H: Do you think AI makes people perform different behaviors?
Z: I don't think so.
H: Do you think AI will cause existential problems for humans?
Z: It may not threaten my life, but I don't know how powerful it will be in the future.
H: Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?
Z: Some OEMs (Original Equipment Manufacturers) like **Xiaomi and BYD** have received **government subsidies**. Those companies must have government help to grow, and the local government is actually very willing to help. For example, BYD factory in Shenzhen, Xiaomi factory in Beijing, they are the **pillar industries** of the two cities. Since the automobile industry has a **very large industry chain**, the **government would expect economic development** from them. So the government will provide **tax incentives and great convenience** to those high-tech companies and good projects, which is also beneficial to the government.
H: I see. I have also heard about the fully automated workshop of Xiaomi.
Z: Yes, because Xiaomi originally produced mobile phones. It is **strong in IOT**, such as smart homes. It uses these technologies in the cars it manufactures, which can all be controlled. Also, as all the **software of Tesla is open to the public** and has no patents, some Chinese companies have begun to overtake Tesla by copying the software. Since there are so many Chinese suppliers, the supply chain problem is also easy to solve. We can **buy the parts at very low prices and sell cars at very low prices to foreign countries**. Sometimes, China's quotation is even lower than the costs of European raw materials.
H: That's why some European traditional automobile manufacturers feel a bit threatened. But are there any challenges or barriers faced by companies when implementing AI solutions?
Z: Some cars can now be remotely controlled and monitored, but if an accident occurs, it is **difficult to determine who is responsible**. Another problem is that China is **difficult to export**. Although we can sell the cars at a very low price, the cars can be operated by software in China, but there are almost no **spare parts supporting service in foreign countries**. So China needs to **build factories abroad**, such as BYD in Hungary and Chery in Spain.
H: Do you think your sector is ready for a widespread use of AI?
Z: Yes, but the **prerequisite is the regulations**. **AI is always faster than humans** in learning, storing data, and does not need to rest. How can people **make better use of it**? Just like using nuclear energy, we need **corresponding institutions, norms, and**

agreements. AI cannot be used to manipulate humans, and it should be **humans who control AI to do certain things**.
H: What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future?
Z: We use AI **for detection to reduce the defect rate**. We **rely on machine accuracy** to ensure that. This technology was relatively new a decade ago, but it is now very common. We can also **connect all production data for analysis**, not only using **ERP**, but also **BI**, and **compare products, labor and revenue**.

Interview 4

1. Interviewee	Jana	**Things to consider:** German automobile companies' choice among traditional vehicles, electric vehicles, and autonomous driving Mercedes: AI assistants in the cars Bosch: start to focus more on the field of AI
2. Gender, age	Female, 34	
3. Nationality	German	
4. Working Position	Application engineer	
5. Department	Manufacturing	

Questions	**Answers**
Ice-breaker	
1. How long have you been involved in the automobile industry?	1. 9 years
2. What is your role within the automobile industry? (sector)	2. Automobile body controller motor and thermal management department, application engineer
3. Have you ever used AI at work?	3. Yes, AI saves a lot of manpower and repetitive work
4. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)	4. AI pure vision recognition of EOL QR code: control production quality and process, reduce the defect rate, manual check is laborious and not accurate
AI-related question	
1. Generally speaking, do you have a positive or negative view of AI?	1. Positive Break down the barriers: chip computing power and memory, AI's ability to collect and process data AI should still be developed, still a certain distance towards humanoid AI
2. Do you think AI is stealing jobs?	2. Yes Fully capable of handling some simple tasks, some jobs where AI can do better than humans (eg. editing text)
3. Do you think you are able to learn well during the application of AI?	3. No It requires a high level of talent, but we still need to keep learning
4. Do you think AI is violating privacy?	4. Maybe, if there is no regulation AI is just a tool The key is who controls it, it can be beneficial or harmful
5. Do you think AI will cause bias in decision making?	5. Yes AI's answers may guide some trends and affect some people's decisions
6. Do you think AI may have the same	6. No

level of consciousness as humans?	Has not yet reached the level, just help us find the best answer Can replace some low-skilled workers, cannot do other things like humans
7. Do you think AI may lead to lack of transparency?	7. No Promote information transparency: can get objective answers
8. Do you think AI makes people perform different behaviors?	8. Maybe not
9. Do you think AI will cause existential problems for humans?	9. No
Industry-related question	
1. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?	1. No idea
2. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI)	2. Production level: no challenges at the R&D, technology Management decision-making level: still too risky, cannot fully cover the industry prospects and interpersonal relationships between companies
Future-related question	
1. Do you think your sector is ready for a widespread use of AI?	1. Maybe Germany is probably still more focused on traditional vehicles: very strong processing and measuring capabilities Electric vehicles or autonomous driving? Many enabling factors need to be considered United States is more advanced in softwares
2. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used)	2. Manufacturing, intelligent simulation, quality inspection
Closing	
1. Is there anything else you would like to add regarding the impact of AI on the automobile industry?	
2. Any recommendations or insights?	

Transcript:

H: How long have you been involved in the automobile industry?
J: Nine years.
H: What is your role within the automobile industry?
J: I am in the Automobile body controller motor and thermal management department and my position is application engineer.
H: Have you ever used AI at work?
J: Yes, I have used it. It has **saved a lot of manpower and repetitive work**.
H: Is there any example related to your work showing that AI has improved efficiency or productivity?
J: For example, we have **AI pure vision recognition of EOL (end of life) QR code**. It can be used to **control production quality and process**. It can **reduce the defect rate**. Because it is **impossible to check one by one manually**, especially during mass production, and manual work is **not that accurate**.
H: Generally speaking, do you have a positive or negative view of AI?
J: **Positive**. In some previous eras, there were more barriers to the development of AI, but now we are **breaking down these barriers** step by step. But I think **AI should still be developed** and it may have only developed by 20 to 30 percent now. If we want to have real AI or **humanoid** robots, there is actually **still a certain distance**.
H: What are the main barriers and how will AI be developed?
J: **Chip computing power and memory** are the main challenges. AI's development nowadays means the improvement of **AI's ability to collect and process data**.
H: Do you think AI is stealing jobs?
J: Yes, it is **fully capable of handling some simple tasks**. And I think there are also **some jobs where AI can do better than humans**. For example, in **editing text**, AI is like a writer who has been well-read, so its writing will basically be better than mine.
H: Do you think you are able to learn well during the application of AI?
J: I don't need to deal with the issues within the scope of AI's capabilities. Then for issues beyond the scope of AI's capabilities, I don't think I have the ability to deal with them. **It requires a high level of talent** to compete with AI's capabilities, but what we need to do is to **keep learning**.
H: Do you think AI is violating privacy?
J: **If there is no regulation**, it will happen. But people are starting to lose privacy now, especially in China. After all, **AI is just a tool**. **The key is who controls it**. If it is well controlled, it will be beneficial. If it is not well controlled, it will be harmful and bring hidden dangers to social security and order.
H: Do you think AI will cause bias in decision making?
J: It will. Just like the delay in releasing the new generation of ChatGPT is because of the US election, because many people may chat with AI and tell them their choices. Then AI will tell others which president has more supporters based on the existing data, which may **guide some trends and affect some people's decisions**.
H: Do you think AI may have the same level of consciousness as humans?
J: No, it **has not yet reached the level** like in the movies. AI can understand what you say to it, and **help you find the best answer**. For example, ChatGPT can give you a very quick answer. This answer combines some current situations, market information, and its thinking. It **can replace some low-skilled workers** based on previous experiences, but it still **cannot do other things like humans**.

H: Do you think AI may lead to lack of transparency?
J: Not really, the popularity of AI will actually **promote information transparency**. We can get an **objective answer** from AI.
H: Do you think AI makes people perform different behaviors?
J: I haven't thought about this before, maybe not.
H: Do you think AI will cause existential problems for humans?
J: I also haven't thought about this. Based on the current situation, I don't think so.
H: Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?
J: As far as I know, there's no regulations. But I'm not quite sure.
H: Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector?
J: There are **no challenges at the R&D, technology** and **production level**, only promotion. But If we want to introduce it at the **management decision-making level**, it is **still too risky**, because the input of historical and real-time data **cannot fully cover the industry prospects and interpersonal relationships between companies**.
H: Do you think your sector is ready for a widespread use of AI?
J: Maybe. But I think **Germany** is probably still **more focused on traditional vehicles**, instead of **electric vehicles or autonomous driving**. Traditional German car companies have **very strong processing and measuring capabilities**, like gears, bearings, and three-coordinate measuring machines. And I don't think we need to give them up. The industry would not be a straight line. There will be peaks and troughs, and things like buildup of charging infrastructure, and **other enabling factors** also will determine how the market develops. Those large automobile companies like Mercedes have also started to include **AI assistants** in the cars.
H: And how about the autonomous driving market?
J: Yeah we also need to admit that the **United States is more advanced in softwares**. And in some cases, if there is a problem with the car, it can be monitored in the background. As far as I know, Bosch just started to focus more on the field of AI, maybe you can have a look at it for more details.
H: What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future?
J: Those robots during **manufacturing** have been used for a long time and their impact is self-evident. Other things like **intelligent simulation** can help CAE (Computer Aided Engineering), AI can help with **quality inspection**, etc.
H: Is there any area where AI should not be used?
J: For now, I think there is no field where it should not be applied.

Interview 5

1. Interviewee	Tobias	**Things to consider:** Nvidia: new chip with strong computing power and its usage, partnership?
2. Gender, age	Male, 41	
3. Nationality	German	
4. Working Position	System development engineer	
5. Department	Technology development	

Questions	**Answers**
Ice-breaker 1. How long have you been involved in the automobile industry? 2. What is your role within the automobile industry? (sector) 3. Have you ever used AI at work? 4. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)	1. 16 years 2. R&D department, specializing in New energy electric drive powertrain, system development engineer 3. Yes 4. Use AI for entry-level work: analyzing and classifying technical requirements Any changes? Give feedback
AI-related question 1. Generally speaking, do you have a positive or negative view of AI? 2. Do you think AI is stealing jobs? 3. Do you think you are able to learn well during the application of AI? 4. Do you think AI is violating privacy? 5. Do you think AI will cause bias in decision making?	1. Positive Because of the increasingly complex technological demands and shortened iteration cycles Improve efficiency: data processing and data analysis at the basic level 2. Yes Entry-level analytical jobs may be replaced 3. Yes Specific requirements for AI were proposed by engineers, have to learn well to be able to use AI 4. Maybe, human training is needed AI has no privacy identification capabilities 5. Yes AI cannot analyze markets and policies very accurately, modifications based on actual understanding of humans are

6. Do you think AI may have the same level of consciousness as humans? 7. Do you think AI may lead to lack of transparency? 8. Do you think AI makes people perform different behaviors? 9. Do you think AI will cause existential problems for humans? Industry-related question 1. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry? 2. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI) Future-related question 1. Do you think your sector is ready for a widespread use of AI? 2. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used) Closing 1. Is there anything else you would like to add regarding the impact of AI on the automobile industry? 2. Any recommendations or insights?	needed 6. Maybe, as long as there is enough training data 7. Yes Companies that dominate AI: tendency to resist transparency, not full information 8. Yes AI does not have ethical judgment and needs human training, may be exploited 9. Maybe make many work handling methods absolute and very rigid, ignore people's feelings 1. No idea 2. Driving safety: not enough training, not accurate enough decision (Needs a lot of experience data to train) Privacy: large amounts of data come from different sources (Formulate relevant policies and regulations) Autonomous driving: collect enough driving data to deal with different situations, should store enough responses, need large capacity of the chip processor (Nvidia?) 1. Yes Certain technical requirements, data analysis, optimization of mathematical models 2. Should be used: The editing function: AI can optimize the functions, write the code, and upgrade all by itself Should not be used: The collection of privacy: the content of the conversation, the driving data (requires policies and regulations to control) 1. cannot reject AI, cannot be too radical either

Transcript:

H: How long have you been involved in the automobile industry?
T: 16 years.
H: What is your role within the automobile industry?
T: I am in the R&D department, specializing in New energy electric drive powertrain, I am a system development engineer.
H: Have you ever used AI at work?
T: Yes, I have.
H: Is there any example related to your work showing that AI has improved efficiency or productivity?
T: We use that for **entry-level work** of **analyzing and classifying technical requirements**. After we get customer needs, which means something like product structure and performance requirements. For example, output volume, power, voltage, current, size, noise, etc. Those requirements and boundary conditions are a prerequisite for us to develop products. Is this product available in the existing product line? If not, what changes are needed? And then is there any impact on the costs because of the changes? Will it also affect the time nodes of our schedule? Based on those **changes**, we can **give feedback** to customers.
H: Generally speaking, do you have a positive or negative view of AI?
T: **Positive**, automobile electrification faces **increasingly complex technological demands** and **shortened iteration cycles**. AI can **improve efficiency**. At present, **data processing and data analysis**, at least **at the basic level**, can be assisted by AI.
H: Do you think AI is stealing jobs?
T: Yes, it is possible. Just like humans can be defeated by AlphaGo, the data is constantly iterating. Current **entry-level analytical jobs** may be replaced by AI.
H: Have they replaced some jobs already or is this just a trend?
T: **Not at the moment**. It is still helping us improve efficiency. At this stage, it is more likely to help, but not to replace someone.
H: Do you think you are able to learn well during the application of AI?
T: Yes, the **specific requirements for AI tools were proposed by engineers**, so engineers had already started learning before. We **have to learn well to be able to use AI**.
H: Do you think AI is violating privacy?
T: Because AI itself has **no privacy identification capabilities**, it **requires human training**.
H: Do you think AI will cause bias in decision making?
T: Yes, although AI can **save us a lot of time**, it is **not easy for AI to analyze markets and policies very accurately**. In addition to the results generated by AI, you may need to make **modifications based on your actual understanding** of the situation.
H: Do you think AI may have the same level of consciousness as humans?
T: Possibly, **as long as there is enough training data**.
H: Do you think AI may lead to lack of transparency?
T: Yes, the **companies that dominate AI** may have a **tendency to resist transparency**. Because there are only two ways for enterprises now. If the company is engaged in AI development, it will hire more high-skilled people and invest more in R&D to further develop

AI. Other companies will buy AI products from them to reduce costs and increase efficiency. But **full information may not be disclosed**.
H: Do you think AI makes people perform different behaviors?
T: Yes, AI itself **does not have ethical judgment** and **needs human training**. It is easy to **be exploited**.
H: Do you think AI will cause existential problems for humans?
T: Maybe. AI may **make many work handling methods absolute and very rigid**, which may **ignore people's feelings** and lead to some problems.
H: Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?
T: I don't have much knowledge about this.
H: Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector?
T: **Driving safety** is still a big challenge. If **the training is not enough**, the **decision-making of AI will not be accurate enough**, and AI will be not sure whether it should transmit the information or not, which may be a risk to safety. AI's ability **needs a lot of experience data to train** in order to become stronger and stronger. And it is because these **large amounts of data come from different sources**, **privacy** is another challenge.
H: Then what should the company do to deal with these challenges?
T: Companies and the whole society should consider carefully and **formulate relevant policies and regulations**.
H: Do you think your sector is ready for a widespread use of AI?
T: Yes, because there are **certain technical requirements**.
H: **Data analysis** based on large amounts of data？
T: Yes, and also **optimization of mathematical models**. This can be applied to **upgrades** based on large amounts of data.
H: Just like what the automobile companies did for autonomous driving?
T: **Autonomous driving** would be another matter. AI must **collect enough driving data to deal with different situations**, including obstacles, pedestrians, other vehicles, etc, so that **enough responses can be stored**. But the **capacity of the chip processor** can be a challenge. Whether it can store so much data or not? Because even if the occurrence rate is very low, those low-probability events should also be included, otherwise an accident will occur. It is said that **Nvidia** has now developed a chip with extremely strong computing power and a wide range of uses.
H: Yeah I have also heard about this and their stock price has risen dramatically. I can have a look at their applications in AI later. So what emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future?
T: **The editing function**. The currently implemented scene editing function may evolve into a technology development function in the automotive industry in the future.
H: What do you mean by "editing"?
T: It means **AI can optimize the functions, write the code, and upgrade all by itself**. Something like machine learning.
H: I see. Is there any area where AI should not be used?
T: **The collection of privacy**. For example, **the content of the conversation** in the car will be recorded, and also **the driving data**. This may **require policies and regulations to control**.
H: Is there anything else you would like to add regarding the impact of AI on the automobile industry?

T: I would say we **cannot reject AI**, but we **cannot be too radical** either.

Interview 6

1. Interviewee	Manfred	**Things to consider:** United Nations: any topics on AI?
2. Gender, age	Male, 53	
3. Nationality	German	
4. Working Position	Product manager	
5. Department	Technology development	

Questions	**Answers**
Ice-breaker 1. How long have you been involved in the automobile industry? 2. What is your role within the automobile industry? (sector) 3. Have you ever used AI at work? 4. Is there any example related to your work showing that AI has improved efficiency or productivity? (manufacturing, supply chain management,...)	1. 27 years 2. Product engineering department, product manager 3. Yes 4. AOI (Automated Optical Inspection) for inspection: compare the finished product with the conditions Vehicle diagnostics and feedback: feed the condition of individual parts back to the panel Software development still relies on programmers
AI-related question 1. Generally speaking, do you have a positive or negative view of AI?	1. Positive Make machines serve mankind, liberate the labor force, let people do things that use their minds instead of simple work
2. Do you think AI is stealing jobs?	2. Yes Material needs: AI can do repetitive work, and work related to text and knowledge summary Spiritual needs: difficult for AI to learn case by case
3. Do you think you are able to learn well during the application of AI?	3. No Can't be blindly confident because of the age, AI learns too fast
4. Do you think AI is violating privacy?	4. Yes Need to clarify the rules and regulations Do the United Nations have any topics on AI?
5. Do you think AI will cause bias in decision making?	5. Yes Information cocoon: receive the information you like and are willing to receive

	Cognitive bias and incomplete understanding of external information
6. Do you think AI may have the same level of consciousness as humans?	6. Yes Like cloning, AI can be perfected
7. Do you think AI may lead to lack of transparency?	7. Yes AI wants to guide you to make a decision: not giving you everything AI can analyze your mindset and provide customized information: giving you one channel We are transparent to AI, but AI is not transparent to us
8. Do you think AI makes people perform different behaviors?	8. Yes Create a perfect person in your ideal type
9. Do you think AI will cause existential problems for humans?	9. Maybe may not happen in my lifetime, but in the future need to draw boundaries and let things develop
Industry-related question	
1. Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?	1. No idea
2. Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector? (How should you/company manage the use of AI)	2. Hard to divide the responsibility (regulations are needed) Not only selling cars, but also services and softwares (follow-up service need to be kept up)
Future-related question	
1. Do you think your sector is ready for a widespread use of AI?	1. No, haven't reached this stage yet Still by humans: Data management and remote fault diagnosis, programming, 3D data modeling, and laboratory testing AI: routine experiments, repetitive tests, and reports with templates Should be a combination of humans and AI: AI test and monitor data, people analyze data
2. What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? (Areas AI should (not) be used)	2. Should be used: smart parking, not very complicated process in production Should not be used: autonomous driving on complex roads and crowded places (in the short term)
Closing	
1. Is there anything else you would like to add regarding the impact of AI on the automobile industry?	

2. Any recommendations or insights?	

Transcript:

H: How long have you been involved in the automobile industry?
M: 27 years.
H: What is your role within the automobile industry?
M: I am in the Product engineering department and work as a product manager.
H: Have you ever used AI at work?
M: Yes, I have.
H: Is there any example related to your work showing that AI has improved efficiency or productivity?
M: For example, we use **AOI (Automated Optical Inspection) for quality inspection**. If there are defects in the process on the production line, like unstable welding, more or less solder paste. We can **compare the finished product with the conditions** that should be met. On a larger scale, AI can be used for **vehicle diagnostics and feedback**. Each vehicle contains around a hundred MCUs (microcontroller units). The **condition of individual parts is fed back to the panel**, such as battery, radiator, coolant, wiper fluid, etc. But we don't use AI for design programming. **Software still relies on programmers**, and I have never heard of AI programming.
H: Generally speaking, do you have a positive or negative view of AI?
M: **Positive**. Because the development of mankind is to **make machines serve mankind**. People come to the world not to work, but to enjoy life. Life cannot be framed on the production line. We must **liberate the labor force**, and **let people do things that use their minds, instead of simple work**.
H: Do you think AI is stealing jobs?
M: I think so. From our current cognitive scope, AI is stealing some jobs which have **repetitive work**, and **work related to text and knowledge summary**. From the perspective of human needs, one is **material** and another one is spiritual. Material needs can be mostly met by AI. But **spiritual needs** are hard to be met. I don't believe there will be AI psychologists, because the manifestations of each patient are different, and it is **difficult for AI to learn case by case**.
H: Do you think you are able to learn well during the application of AI?
M: No, **I am getting old**. I can try my best, but **AI learns too fast**. I **can't be blindly confident** that I can catch up with it. I would expect there is a device to improve my brain power.
H: Do you think AI is violating privacy?
M: Yes, so we **need to clarify the rules and regulations**, what can be touched and what cannot be touched. I'm not sure if the state has realized this problem and has taken steps in this direction. Moreover, the world is changing. There are too many wars and crises now. I wonder if the **United Nations has any topics on AI**.
H: Do you think AI will cause bias in decision making?
M: Yes, an **information cocoon** will be created. Almost all the information you collect is **the information you like and are willing to receive**. This will cause **cognitive bias and incomplete understanding of external information**, which will lead to decision-making bias.

H: Do you think AI may have the same level of consciousness as humans?
M: I think so. **Like cloning**, **AI can be perfected**, and it may be also possible for humans to create humans.
H: Do you think AI may lead to lack of transparency?
M: Of course, just like the decision-making bias before. If **AI wants to guide you to make a decision**, it **will not give you everything**. It will give you what it thinks you will accept and what it needs you to accept. Because **AI can analyze your mindset and provide customized information** according to your needs. Unlike our thinking, which is diffuse, AI **only gives me one channel**, which is opaque to other channels. For example, if an AI wants to sell something to me, it will position people according to their age, gender, education level, hobbies, consumption habits, etc., and then it will give information suitable for people like me. But maybe I like things for people in their 20s, but I don't have much information about this. **I am transparent to AI, but AI is not transparent to me**.
H: Do you think AI makes people perform different behaviors?
M: Yes, I think it is likely to happen. AI can **create a perfect person in your ideal type**.
H: Do you think AI will cause existential problems for humans?
M: Yes, just like what we see from the movies. It **may not happen in my lifetime, but in the future**. But first of all, people need to do something now. If we don't **draw boundaries and let things develop**, there will definitely be problems.
H: Are there any policies or regulations driving/hindering the adoption of AI technologies within the automobile industry?
M: I don't know much about this aspect.
H: Can you describe any challenges or barriers faced by companies when implementing AI solutions in the automobile sector?
M: If something goes wrong with the car because of the AI operation, it is **hard to divide the responsibility**. Is it the company's responsibility or the owner's responsibility? Is it the owner's carelessness or the car's performance problem? Should the company pay the compensation or not? So **regulations are needed**, but it is still difficult to define.
H: How about the economic challenge?
M: It is actually hard to say. The situation is very complicated nowadays, including cooperation, acquisition, investment in R&D, and very wide coverage. Because we are **not only selling cars, but also services, and softwares** need to be paid. Previously, a car was exported from China to Germany at a very cheap price. However, after a breakdown, they didn't have spare parts in Germany and the **follow-up service** did not keep up. Even if they knew where the error was, it was useless.
H: Then how about the domestic product?
M: If there was a problem with a car produced in Germany, we could drive a spare car first and solve the problem of the whole car in about a week.
H: Do you think your sector is ready for a widespread use of AI?
M: I think we **haven't reached this stage yet**, maybe my understanding is relatively narrow. **Data management and remote fault diagnosis** in automobile factories are still **done manually**, not by AI. It **should be a combination of humans and AI**. **Data can be tested and monitored by AI**, but **data analysis still relies on people**. We can only know where the problem is, but it is people who need to repair it. From the perspective of AI development, I think it has not been achieved. **Programming, 3D data modeling, and laboratory testing** all require engineers, and AI cannot replace them. Unless they are **routine experiments, repetitive tests, or reports with templates**.

H: What emerging AI technologies or trends do you think will have the greatest impact on the automobile industry in the near future? In which areas AI should be used or should not be used?
M: In the short term, it must be **autonomous driving**, because we are all moving in this direction. Autonomous driving **on complex roads and crowded places** is still dangerous, but **smart parking** can be widely promoted. In production, if the **process is not very complicated**, AI can be used.