EMPIRICAL RESEARCH ON AGING WORKFORCE MANAGEMENT

SECONDARY DATA, GROUNDED THEORY, AND CASE STUDY FINDINGS WITH PARTICULAR CONSIDERATION OF THE AUTOMOBILE INDUSTRY

by

Dipl.-Kfm. Christoph Klaus Streb

A thesis submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in Business Administration

Jacobs Center on Lifelong Learning and Institutional Development
Jacobs University Bremen

Approved Thesis Committee:
Prof. Dr. Sven Voelpel, Business Administration, Jacobs University Bremen
Prof. Marius Leibold, PhD, Strategic International Management, University of Stellenbosch
Prof. Dr. Adalbert FX Wilhelm, Statistics, Jacobs University Bremen
Prof. Dr. Horst-Erich Rikeit, Industrial Engineering, University Bremen

Date of Defense: April 7th, 2008
"Don't find fault, find a remedy."

Henry Ford
FOREWORD

There is an interesting anecdote about the inventor and entrepreneur Thomas Edison. While his teachers believed him to be too slow to learn and he was fired twice from his first job for a “lack of productivity”, he developed the light bulb after about a thousand attempts. When a journalist asked him how it felt to fail a thousand times, it is said that he answered: “I didn’t fail a thousand times. The light bulb was an invention with one thousand steps.”

This story may or may not be true, what matters, is that which has always distinguished great, successful people from average ones: Perseverance in pursuing their vision, no matter who or what challenges them. In Winston Churchill’s words: “Never give in, never give in, never, never, never, never – in nothing, great or small, large or petty – never give in except to convictions of honor and good sense. Never, Never, Never, Never give up” (Churchill’s capitals).

The research presented in this PhD thesis cannot be compared to the great achievements of people of this ilk. However, in a way that is akin to the thousand small steps, I hope that my studies can contribute to a topic and field of research that might require a similarly dogged perseverance to achieve sustainable improvements. Moreover, looking back on the last three years of research work as a PhD fellow in both academia and business, I now know that while there are experiences that and people who support you in this often very daunting endeavor, there are times when your vision seems out of reach if you want to stay honest to yourself. As one of my interview partners put it: “In this environment, you have to grow such a thick skin that you are able to stand upright without a backbone.”

The key to achieving success despite obstacles lies in perseverance and the continuous belief in one’s own dreams and awareness that the mistakes from which we learn are the academic world’s most valuable gifts.

There are a number of people to whom I owe gratitude for their continuous belief in both my
work and me. Foremost, I would like to thank Prof. Dr. Sven Voelpel, my first supervisor, and Prof. Marius Leibold, my second supervisor, for guiding me on my academic paths for more than four years and for their fatherly and amicable advice during this time. I owe them much for what I have learned about life and academia and I am honored to count them among my colleagues and friends. The same holds for Prof. Dr. Adalbert Wilhelm and Prof. Dr. Horst-Erich Rikeit, my third and fourth supervisor, who were always there for me when I needed support and guidance. It would have been impossible to write this PhD thesis without them.

Special thanks goes to Prof. Dr. Horst-Erich Rikeit and Dr. Winfried Hilbig, in their function as my supervisors at the Mercedes-Benz plant in Bremen, for their patience and understanding, as well as their trust in offering me the PhD position at Daimler AG. Prof. Dr. Günther Ruhe’s example attracted me to academia in the first place; his academic approach is my guiding example. The unselfish support of these friends has enriched my life and my work.

I would like to thank my parents and my whole family for supporting me through all my years of study. Without their tolerating my short-temper in difficult times, I would not have been able to complete this thesis. My mother may, in fact, care more about my PhD thesis than I do. This work is therefore dedicated to her to atone for the hard times.

Hartmut Jacobs, my friend and mentor, passed away in October 2006 – a great loss to his friends and family. I wish he could have been here to witness the completion of my PhD as he taught me how to “find” instead of just “search”. His unlimited wisdom and advice were of great value throughout my studies and are sorely missed. Almost as important to me as my family are my fellow brethren in Wiesbaden. I always found comfort with them – a home from home.

During the three years in Bremen, a number of people became friends, teaching me some
valuable life lessons. Thanking them all would in itself require a chapter. Instead, I would like to say thank you to T. Brown for having the power to cheer up the most melancholic of characters and always finding a silver lining to Bremen’s dark clouds. Special thanks go to Ilse Evertse who, with her unique skills and honest comments in all matters, has greatly contributed to my work.

I would also like to express my gratitude to the Stiftung der Deutschen Wirtschaft for granting me a scholarship. Their unique program and open-mindedness have enriched my life.

There are many deserving people whom I should mention here. My thanks to every one of you.

Christoph Streb

Bremen, December 2007
Table of Contents

- A .............................................................................................................................................................. 1
  A.1. EXECUTIVE SUMMARY .......................................................................................................................... 1
  A.2. INTRODUCTION ....................................................................................................................................... 2
    A.2.1. Workplace Design ............................................................................................................................. 5
    A.2.2. Health Management ......................................................................................................................... 5
    A.2.3. Employee Deployment ..................................................................................................................... 6
  A.3. RESEARCH BACKGROUND .................................................................................................................... 6
  A.4. OBJECTIVES AND SCOPE OF THE DISSERTATION .............................................................................. 9
  A.5. CONTENT AND LIMITATIONS OF THE DISSERTATION ....................................................................... 13
    A.5.1. Article I ............................................................................................................................................ 13
    A.5.2. Article II .......................................................................................................................................... 14
    A.5.3. Article III ........................................................................................................................................ 15
    A.5.4. Limitations ...................................................................................................................................... 17
  A.6. REFERENCES (INTRODUCTORY CHAPTER) ......................................................................................... 20

- B .............................................................................................................................................................. 23
PART I .............................................................................................................................................................. 23
MANAGING THE AGING WORKFORCE: STATUS QUO AND IMPLICATIONS FOR THE ADVANCEMENT OF
THEORY AND PRACTICE ................................................................................................................................. 23
  B.1. INTRODUCTION ................................................................................................................................... 24
  B.2. RESEARCH METHODOLOGY ............................................................................................................... 27
  B.3. ANALYSIS OF THE STATUS QUO OF RESEARCH INTO THE AGING WORKFORCE .................. 29
    B.3.1. Managerial Mindset ....................................................................................................................... 30
    B.3.2. Knowledge Management and Learning ........................................................................................... 32
    B.3.3. Health Management ....................................................................................................................... 35
    B.3.4. Work Environment and Ergonomics ............................................................................................... 37
    B.3.5. Human Resource Management ..................................................................................................... 39
  B.4. SYNTHESIS AND DISCUSSION OF FINDINGS .................................................................................... 41
  B.5. CONCLUSION ...................................................................................................................................... 45
  B.6. REFERENCES ...................................................................................................................................... 46

- C .............................................................................................................................................................. 53
PART II .............................................................................................................................................................. 53
AGING WORKFORCE MANAGEMENT IN THE AUTOMOBILE INDUSTRY: DEFINING THE CONCEPT AND ITS
CONSTITUTING ELEMENTS ............................................................................................................................... 53
  C.1. INTRODUCTION ................................................................................................................................... 54
  C.2. RESEARCH GAP ................................................................................................................................... 56
  C.3. RESEARCH METHODOLOGY ............................................................................................................... 58
    C.3.1. The Sample ..................................................................................................................................... 59
    C.3.2. Participant Observation .................................................................................................................... 61
    C.3.3. The Interviews ................................................................................................................................. 62
    C.3.4. Data Analysis .................................................................................................................................. 63
  C.4. RESULTS AND INTERPRETATION .......................................................................................................... 67
    C.4.1. Aging Workforce Challenge Defined: What are its Constituting Elements? ............................. 68
    C.4.2. Aging Workforce Management: The Residual Elements ............................................................ 73
  C.5. IMPLICATION FOR FURTHER RESEARCH ....................................................................................... 77
  C.6. REFERENCES ...................................................................................................................................... 80
PART III

ANALYZING THE EFFECTIVENESS OF CONTEMPORARY AGING WORKFORCE MANAGEMENT – THE CASE OF DAIMLERCHRYSLER

D.1. INTRODUCTION

D.2. THE DAIMLERCHRYSLER PLANT IN BREMEN

D.3. RESEARCH METHODOLOGY

D.4. ANALYSIS OF THE EFFECTIVENESS OF THE AGING WORKFORCE MEASURES IN THE DAIMLERCHRYSLER PLANT IN BREMEN

D.4.1. Background of “Kraftwerk Mobil”

D.4.2. Analysis of “Kraftwerk Mobil”

D.4.3. Background of “Fit-Shop”

D.4.4. Analysis of the “Fit-Shop”

D.4.5. Background of “Rotation”

D.4.6. Analysis of “Rotation”

D.4.7. Background of “Ergonomics”

D.4.8. Analysis of “Ergonomics”

D.4.9. Background of “Demographically Oriented Relocation”

D.4.10. Analysis of “Demographically Oriented Relocation”

D.5. CONCLUSION

D.6. REFERENCES

D.7. NOTES

E.1. SUMMARY OF DISSERTATION ARTICLES

E.1.1. Summary of Research Findings: Article I

E.1.2. Summary of Research Findings: Article II

E.1.3. Summary of Research Findings: Article III

E.2. SYNTHESIS OF DISSERTATION ARTICLES

E.2.1. Kraftwerk Mobil

E.2.2. Fit-Shop

E.2.3. Rotation

E.2.4. Ergonomics

E.2.5. Demographically Oriented Relocation

E.2.6. Summary

E.3. IMPLICATIONS FOR RESEARCH AND PRACTICE

E.4. REFERENCES (SUMMARY, SYNTHESIS, AND IMPLICATIONS)
Table of Figures

Figure A.1: Schematic Age Distribution of the Mercedes-Benz Plant in Bremen. ............................................... 3
Figure A.2: Aging Workforce Management across all Aspects of Human Resource Management. ..................... 5
Figure A.3: Overview of the Main Concerns with Regard to an Aging Workforce. ............................................. 7
Figure A.4: The Connecting Thread of this Dissertation. ..................................................................................... 12
Figure A.5: Content of Dissertation. ..................................................................................................................... 16
Figure C.1: A Schematic Overview of the Conducted Coding Process. ............................................................... 65
Figure C.2: Schematic Coding Process for the Competitiveness Example. .......................................................... 66
Figure C.3: Major and Secondary Elements Constituting the Aging Workforce Challenge. ............................... 73
Figure C.4: A Conceptual Framework of the Interrelated Elements Apparent in the Management of the Aging Workforce in the Automobile Industry. ............................................................. 79
Figure D.1: Schematic Age Distribution of the DaimlerChrysler Plant in Bremen. ............................................. 90
Figure E.1: Status Quo Overview in Article I. .................................................................................................... 130
Figure E.2: Schematic Overview of the Conducted Coding Process in Article II. .............................................. 134
Figure E.3: The Potential Impact of “The Human Factor” and “Leadership” on the Successful Implementation of Aging Workforce Measures (Schematic Interpretation). ....................................................... 144
Figure E.4: Synthesized Interrelationships of the Aging Workforce Challenge and the Constituting Elements of Aging Workforce Management. ................................................................. 146
Figure E.5: Aging Workforce Management as an Expanded Field of Research. ............................................. 148

Table of Tables

Table B.1. Status Quo Overview. ......................................................................................................................... 42
Table C.1. Background on Sampled Interviews. ................................................................................................. 60
A.1. EXECUTIVE SUMMARY

The demographic change in many western industrialized societies’ populations points to one of the most negative future scenarios in business management: The increasing average age mirrored in the workforce and labor pool. In an industry that relies on physical work performance as an important input factor, such as automobile mass production, this will lead to a workforce that is limited in terms of employability and is thus more expensive, since organizations have to cover absenteeism and/or the loss of value creation on production lines. Empirical evidence demonstrates that increased costs, a lack of flexibility, as well as increased global demands in terms of productivity have resulted in a potential threat to sustainable competitiveness.

The successful management of an aging workforce is an evolving field of research that has to date provided little on which advanced studies could be built. This dissertation therefore aims to approach the topic of aging workforce management in the automobile industry in an exploratory manner, clarifying fundamental concepts that have been neglected by managerial sciences, but that are, in fact, elementary and crucial for the development of sound research in future. To achieve this aim, this dissertation presents the cumulated results of three articles, that

1. identify the status quo of the aging workforce management from a management science perspective in theory and practice,

2. provide answers regarding how the aging workforce challenge as a topic and the elements that constitute its management can be defined, and

3. evaluate the effectiveness of applied aging workforce measures in practice.
A.2. INTRODUCTION

The demographic change in many western industrialized societies’ populations points to one of the most negative future scenarios in business management: The increasing average age is mirrored in the workforce and labor pool (cp. Bureau of Labor Statistics, 2007; Dychtwald, Erickson and Morison, 2006; Leibold and Voelpel, 2006; United States General Accounting Office, 2003). In many organizations, this will lead to a workforce that, on average, is well in its forties, approaching the fifties. These people, often referred to as the ‘baby boom generation,’ will soon retire, potentially leaving with valuable knowledge that they have acquired during their active working years (DeLong, 2004). Moreover, with regard to the physical dimension of aging, a constrained workforce, i.e. one that is limited in terms of employability due to physical deterioration, is expensive as organizations have to cover absenteeism and/or the loss of value creation (Status Report Daimler AG, 2007; cp. Avolio, Waldman and McDaniel, 1990). Increased costs, a lack of flexibility, as well as increased global demands in terms of productivity have resulted in a potential threat to sustainable competitiveness.

Every company has to define the potential impact of this development individually. Service and high-tech companies, as well as corresponding departments will face different challenges than, for example, a car manufacturer. In the service and consulting industry, knowledge and personal networks are key. It is therefore crucial that they ensure the transfer of know-how from one generation to the next before valuable experts retire (DeLong, 2004). An important question for high-tech companies is: To what extent does an aging workforce influence innovativeness?

The physical capability and competitiveness of blue-collar workers are under scrutiny at an automobile production facility like the Mercedes-Benz plant in Bremen, where a significant
part of the research for this PhD thesis was conducted. Here the important question is: How can competitiveness be maintained and improved in an increasingly globalized business environment in terms of costs, efficiency, and product quality despite an aging workforce?

The challenge is obvious: In 2002, the average age of the overall workforce was approximately 40. Currently it is around 44 and, if conditions remain the same, could increase to 47.5 in 2010 and to more than 50 in 2016 (see Figure A.1).

![Figure A.1: Schematic Age Distribution of the Mercedes-Benz Plant in Bremen.](image)

**Figure A.1: Schematic Age Distribution of the Mercedes-Benz Plant in Bremen.**

*(Adapted from: Status Report Daimler AG, 2007)*

---

1. With effect from October 2007, the DaimlerChrysler AG has been called Daimler AG. The Mercedes car-producing plants are referred to as Mercedes-Benz plants. In the introductory part of this thesis, the terms Daimler AG and Mercedes-Benz plant will be used. Since the integrated articles were completed before this change of name, and since they are presented in this thesis the way they were accepted or submitted, they continue to refer to DaimlerChrysler AG and DaimlerChrysler plants.

2. The term “Direct Blue Collar Workforce” refers to workers directly employed by the Mercedes-Benz plant Bremen as, for example, production line workers. The term “Indirect Blue Collar Workforce” refers to workers employed by the plant in support task not directly related to the core task of car production (security, maintenance, etc.).
For Daimler AG as a whole, this development could mean that in 2011 approximately 68% of its workforce will be more than 45 years old (Status Report Daimler AG, 2007).

As indicated in Figure A.1, the Bremen plant has a relatively homogenous workforce, due to large-scale hiring during the 1980s. Many people will therefore reach retirement age simultaneously. Empirical data at the plant confirms that the number of sick-leave days and the number of constrained workers are increasing as the age average increases (Status Report Daimler AG, 2007). This is considered a serious threat for the plant’s cost structure and therefore its competitiveness. Consequently, the company has to take action to ensure a competitive workforce through appropriate human resources management.

A cornerstone of the aging workforce management at the Mercedes-Benz plant in Bremen is the headquarters’ directive regarding a holistic approach to this topic. According to this guideline, the challenge must be approached from the perspective of an overall human resource development strategy ranging from career entry to retirement across all aspects of human resource management (see Figure A.2).

The Bremen plant, which is mainly a production facility focusing on production line workers, emphasizes workplace design, health management, and employee deployment in the context of its aging workforce management. The plant’s management is seeking to identify, develop, and implement adequate measures and tools in each of these three areas. Each one will be briefly described below (cp. Status Report Daimler AG, 2007). Article III of this thesis contains a more detailed description and analysis of the most important tools implemented.
A.2.1. **WORKPLACE DESIGN**

The physical capabilities of an aging workforce are under scrutiny at the Mercedes-Benz plant Bremen. This includes preventing health problems and reintegrating constrained workers into the value-creating production process. Ergonomists and plant doctors have worked towards these goals by means of tools that analyze and describe individual workplace requirements, especially of workplaces that cause critical physical strain, seeking to improve them. Once a number of workstations have been documented, the data can be used to organize rotation plans, as well as to develop a map of the plant’s workstations with their specific physical requirements. Both measures would allow constrained workers to be re-integrated into production by matching specific job requirements with individual capabilities.

A.2.2. **HEALTH MANAGEMENT**

In the field of health management, the main focus of the related activities is to ensure that each worker is responsible for his or her own physical well-being and capabilities. Basically,
this has to be achieved by a new fitness centre or “Fit-Shop” on the plant’s premises and the “Kraftwerk Mobil”, a training device to improve the potential imbalances in abdominal and back muscles. While the “Fit-Shop” offers the employees a multidimensional range of fitness and physiotherapeutic services (with preventive and restorative goals), the “Kraftwerk Mobil” addresses back problems as a primary cause of absenteeism by offering employees training at the production line.

A.2.3. EMPLOYEE DEPLOYMENT

Employee deployment measures are strongly influenced by the results of ergonomics. As mentioned, job rotation is one of the most popular tools to vary physical strain and improve versatility. The “Bremer Rotationsmodell” is described in detail and the effectiveness of the tools implemented in the plant is considered in article III of this thesis. Besides rotation, a demographically oriented relocation system was also implemented to counteract over-aging in some areas as a result of the relocation of mainly younger workers. With this system, a better mixture of younger and older workers is guaranteed.

A.3. RESEARCH BACKGROUND

Besides the directives and measures described above, the Mercedes-Benz plant in Bremen networked with its headquarters, other plants, other car manufacturers, and academia. The research that is presented in this thesis was initiated by the collaboration between the Mercedes-Benz plant in Bremen and the Jacobs Center on Lifelong Learning and Institutional Development at the Jacobs University Bremen. Since 2004, the two organizations have worked together in researching and managing the challenge of an aging workforce in the corporate context. As a part of this collaboration, the author of this thesis took up his studies
and work at the plant as a PhD Fellow and employee in January 2005.

As an automobile producing facility, the Mercedes-Benz plant in Bremen mainly focuses its efforts on production line workers. The company noticed a strong correlation between average worker age and the number of sick days or constraints in employability (Status Report Daimler AG, 2007). Consequently, the initial research question was: How does the plant maintain and increase its competitiveness while facing an increasing number of older blue-collar workers?

Figure A.3 provides an overview of the plant’s primary concerns with regard to an aging workforce.

Figure A.3: Overview of the Main Concerns with Regard to an Aging Workforce.
The increasing average worker age is a major concern in respect of the competitive business environment of the automobile industry – in terms of cost pressure, increased productivity, and use of technology. The aging workforce is expected to have an impact on versatility, number of constrained workers, sick days and related costs, knowledge loss, innovation, motivation, and therefore on the overall quality of the work. In the course of this research, however, the issues of knowledge loss and innovation were less important due to their lack of potential application in a mainly blue-collar production facility.

As can be deduced from the figures, the description of the challenges, and the advanced approaches described in the previous sections, the Mercedes-Benz plant in Bremen is an excellent object of investigation in terms of aging workforce management. Most importantly, the age average is already relatively high. The workforce of many other companies in, for example, Germany will not reach the average age of the Bremen plant for a few years yet. Research at the plant could therefore focus other, similar companies’ attention on the anticipated demographic developments, the related challenges, and potential solutions, as the Bremen plant has already proactively applied a number of tools and measures to address the main issues of an aging workforce. In addition, the plant is seeking academic advice by collaborating with researchers. Consequently, the opportunity to investigate this particular organization’s advanced experience with aging workforce management will provide valuable insights into the impact of aging on organizational competitiveness and effective counteractive measures. A significant part of the research presented in the thesis at hand, especially with respect to the third article, was therefore conducted at the Bremen plant.

The author’s engagement in the organizational setting of the Mercedes-Benz plant in Bremen can best be described as similar to the participant observation approach usually found in human studies or in the field work of social sciences in general (Jorgensen, 1989). Although, participant observation as a methodology is only a relatively small part of the overall
approach applied in the course of this thesis – it is, for example, described in detail in the second article – the basic concept of complete and intense involvement with the topic and issues under study did become a guiding paradigm of the author’s research. In the next section, the pivotal objective and scope of this thesis are described in detail.

A.4. OBJECTIVES AND SCOPE OF THE DISSERTATION

Aging workforce management is an evolving field of research that has, to date, provided little on which advanced research could be built (Streb, Voelpel and Leibold, 2008). The general objective of this dissertation is therefore to approach the topic of aging workforce management in an exploratory manner, clarifying fundamental concepts that have been neglected by managerial sciences, but that are, in fact, elementary and crucial for the development of sound research in future. With regard to this objective, the status quo of the field, and the identification of further research gaps are of specific interest to ultimately arrive at an exhaustive concept.

This broad objective corresponds directly to Glaser and Strauss’s (1967) basic understanding of how research has to be conducted in the absence of existing hypotheses, models, and frameworks. The author of this thesis thus addresses this paradigm by acknowledging that, with regard to an emerging field of study, it is paramount to provide the scientific community with a clear understanding of what the topic embraces, how it can be defined, which specific research questions are pivotal and, with regard to management science, how the topic is perceived and approached in a real organizational setting. Following Glaser and Strauss (1967), this thesis applies qualitative research methods to provide the necessary foundation for future theory development, which is not, however, within the scope of this work.

The status quo analysis of the field under investigation is a logical primary step. This analysis is therefore the first specific research objective in the context of the exploratory overall
approach of this thesis and is addressed in the first article:

1. *Identifying the status quo of the aging workforce management from a management science perspective in theory and practice.*

   The answers provided in this respect should clarify how far the topic has developed in the relevant management science literature, as well as in business practice and what the important research gaps are.

As will be shown in detail in the synthesizing section of this thesis, answering this first specific objective opens a variety of potential new research questions. The first article provides insights into relevant issues from a theoretical (literature review) and a practical (case review) perspective, thus also indicating the research gaps in both areas. In the two subsequent studies, the author chose to address those research gaps that contribute most to the above-mentioned general goal of this thesis. Hence, the following two specific objectives were derived:

2. *Providing answers regarding how the aging workforce challenge can be defined as a topic and identifying the elements that constitute its management.*

   As the first article indicates, there is as yet no clear theoretical concept of aging workforce management. However, as identified by Glaser and Strauss’s (1967) paradigm, an evolving field of study requires a clear and sound definition and identification of the crucial issues and elements. This is paramount for rigorous research to emerge. Therefore, this research gap needs to be addressed.
3. **Evaluating the effectiveness of applied aging workforce measures in practice.**

Another insight provided by the first article is that there are as yet no tools specifically designed to address the aging workforce challenge. The tools that have been applied are merely aimed at alleviating the symptoms of an aging workforce, like health problems. This begs the question of how effective these measures actually are in organizational reality and if the objectives of aging workforce management can be met despite of that.

Answering the research objectives two and three resulting from the first article provides valuable insights required for future theory development from both a theoretical and practical perspective. This is in alignment with the overall research goal of this thesis.

While the first objective is dealt with by a secondary data analysis of the relevant literature and practical examples, the second, according to Glaser and Strauss (1967), requires the application of a grounded theory approach due to the limited previous research in the field and the elementary issues that need to be clarified in this respect. The case study approach, in line with Yin (2003), provided valuable results for the evaluation of applied measures in an organizational setting. Each of these studies, including their methodological background, are described in detail in each article.

Although this dissertation aims at exploring fundamental workforce management issues, which are inalienable prerequisites for sound research in the field, the author does not intend to provide all the information required for a full scale model of aging workforce management. The above should clarify that the scope of this thesis is intentionally limited to the most pressing issues apparent in and resulting from the status quo analysis. The cumulated results at the end of this dissertation are, however, presented as original and seminal work with which to initiate further research efforts. Figure A.4 summarizes the three
specific objectives of this dissertation, their intention, and the applied research approach that is the connecting thread running through the dissertation, ultimately leading to the synthesis in the final chapter.

---

**General Objective of the Thesis**

Exploring aging workforce management and clarifying fundamental concepts

---

**Article I**

**Specific Objective**

Identifying the current status quo of the aging workforce topic in theory and practice

**Methodology**

Reviewing the literature and practical examples, applying second data analysis

**Finding**

Secondary and empirical research findings on the aging workforce adopting a business management perspective (in theory and practice)

---

**Article II**

**Specific Objective**

Theoretically defining the challenge and identifying the constituting elements of aging workforce management

**Methodology**

Qualitative data collection and analysis (e.g. archival data and interviews) applying grounded theory

**Finding**

Definition of the challenge of managing an aging workforce and constituting elements in the context of one specific industry

---

**Article III**

**Specific Objective**

Evaluating the effectiveness of applied aging workforce measures in practice

**Methodology**

Qualitative data collection and analysis (interviews) applying a case study

**Finding**

Effectiveness of a set of five practical health and human resource measures found at the Mercedes-Benz plant in Bremen

---

**Synthesis of the Thesis**

Fundamental insights and seminal results that provide new potential research streams in the field of aging workforce management

---

**Figure A.4: The Connecting Thread of this Dissertation.**
A.5. CONTENT AND LIMITATIONS OF THE DISSERTATION

In terms of the three objectives of this thesis, the results of the above-mentioned research are presented in three articles accepted by or submitted to leading journals in the fields of business and managerial science. Together, they represent the complete thesis, including the detailed research approach, background information on each separate study, as well as details on the research methodology (e.g., sample, data collection, and analysis). Although each of the articles has a separate focus and is presented in the next three consecutive chapters as submitted to a journal, they are clearly coherent and are part of the same general objective of this dissertation.

A.5.1. ARTICLE I

The first article is a comprehensive review of the current status quo of aging workforce management from a theoretical and practical management perspective. The author reviewed the top forty business management journals, as ranked by the Financial Times, in terms of aging workforce management. The best practice examples that the author encountered during his research are also presented. The results are categorized according to the five action fields of aging workforce management as identified by Leibold and Voelpel (2006).

In this article, some important research gaps and questions become apparent. While research has been done on aging workforce issues, this research had not been integrated into a specific business management perspective. Moreover, it is still unclear what the potential performance weaknesses and strengths of an older workforce are within specific industries and occupations, as research has to date been largely limited to laboratory settings. In addition, the best practices found in empirical cases have not yet been broadly introduced into aging workforce management and are not part of any coherent and holistic aging workforce management approach. This is related to the important practical question of what new and
specific tools need to be developed to counteract an older workforce’s potential downsides and to leverage its potential advantages. Most importantly, aging workforce management has not yet been defined, nor is there an integrated concept in managerial practice. Although a number of tools and measures are applied in managerial practice, there is little clarity about their effectiveness, since they were not originally designed and implemented to specifically address the challenge of an aging workforce.

In order to advance the understanding of aging workforce management as an evolving field of study, the most important objectives that emerge from the first article are to provide the theoretical basics, such as a definition of the topic and related issues, as well as determining how effective the measures are that have already been implemented. Aging workforce management is thus explored in general and further research gaps are identified.

Subsequently, an applied qualitative research approach, and outlined in the previous section, is described in the second and third articles. This qualitative approach consists, first, of a grounded theory study across countries and companies in the automobile industry to develop a preliminary concept of the aging workforce challenge and aging workforce management. Second, the approach consists of a case study within the Mercedes-Benz plant Bremen that analyzes the effectiveness of applied aging workforce tools within this specific organizational setting.

A.5.2. ARTICLE II

Interviews aimed at identifying the constituting elements of aging workforce management were analyzed for the grounded theory study based on the paradigm by Glaser and Strauss (1967). This led to a first definition of the aging workforce challenge, as well as an understanding of the concept of aging workforce management. Within the limited sample, the results allow us to define the aging workforce challenge as the interaction of increased
requirements in terms of productivity, efficiency, and cost resulting from increased competition, and the measures that aim to provide the required competitiveness (e.g. the standardization of work or the demand for more flexibility and performance from the workforce) on the one hand, and aging workforce symptoms (e.g. the increased number of constrained workers, days absent, and a lack of commitment) on the other. The aging workforce challenge lies in this area of potential conflict. By applying a coding process in keeping with Glaser and Strauss (1967) and Miles and Huberman (1994), competitiveness, together with the other two elements described above, is identified as a major constituting element characterizing the aging workforce challenge. The actual aging workforce management is thus constituted by the residual identified elements like “measures addressing the aging workforce,” the “human factor,” and, eventually, “leadership.” While the details of their interrelation are described in the second article, this study provides insights into the meaning of an aging workforce management for the first time, albeit for this specific industry only. However, future research efforts that address the interactions between the identified elements, and the expansion of research into other industries to specify and verify the results of this study, are strongly recommended.

A.5.3. ARTICLE III
Having answered some first important research questions, the third article is aimed at evaluating the effectiveness of a set of practical health and human resource measures applied at the Bremen Mercedes-Benz plant, in order to constitute a first study of the potential success of aging workforce tools as typically introduced in many other companies, not necessarily just in the automobile industry. The applied case study approach, which is in keeping with Yin (2003), is mainly based on 30 interviews across functional and hierarchical levels at the plant. The case study sought to arrive at a full evaluation of all five identified
tools. The results imply that although each measure successfully addresses one or several of the typical symptoms of an aging workforce (e.g. absenteeism), the fact that the workforce continues to age and that related problems continue to escalate, is not sufficiently addressed. Therefore, a number of additional approaches, identified during the interviews, are suggested in order to address the problem in a sustainable and holistic way.

In short, this thesis ranges from a review of the status quo of aging workforce management in the relevant literature and business practice, to two qualitative studies answering important questions such as how aging workforce management is constituted, and how effective its current tools and measures are. Together, these studies provide a comprehensive preliminary and exploratory understanding of aging workforce management with particular consideration of the automobile industry. The thesis’s broad content structure is illustrated in Figure A.5.
A.5.4. LIMITATIONS

Each of the applied methodologies and research approaches provides the researcher with certain advantages, as well as limitations, which determine the methodological and result limitations of the overall thesis. Although these limitations were taken into account, it was felt that they would be outweighed by the potential benefits of a qualitative approach undertaken within the proximity of the objects of investigation (Creswell, 2003).

The major limitation of the review study is addressed by focusing, first, only on the journals found in the Financial Times Top 40 list of 2006 and, second, by only considering publications in these journals between 1987 and 2007. These criteria might therefore exclude contributions in other journals or those published before 1987. What are consequently the advantages of the chosen approach?

The authors of the relevant articles aimed at answering questions regarding the status quo of aging workforce management from a business management perspective. A criterion that would ensure focus and quality was thus required to avoid a large quantity of unrelated data and to provide a first filter for the analysis. The Financial Times Top 40 list provides a distinguished list of high quality journals in the field that are highly relevant to and have an impact on business practice, thus serving as a quality gate for the authors’ findings. Moreover, limiting the relevant publications to the last 20 years automatically excluded outdated research.

Similar issues apply in respect of the case examples, although it has to be specifically emphasized that the authors of the articles did not intend to provide an exhaustive review of all potential tools and measures in the field. This would have been an impossible task as the field is simply not yet researched well enough. As specifically stated in the first article, it was merely the intention to identify exemplary measures from a variety of industries to inform the
unacquainted reader about the status quo in management practice, while simultaneously mirroring the organizational reality.

All three articles rely on interviews and archival information as an important source of data. Collecting and analyzing this kind of qualitative data can be very challenging and requires a high level of prudence to ensure the validity and reliability of the concluded findings (Miles and Huberman, 1994). Yin’s (2003) recommendations were a decisive guideline during the interviews for the first article, as well as during the entire the grounded theory and case study research. Since generalizability was not intended, and since the general objective of this thesis is an exploratory one, the author focused largely on ensuring the general validity and reliability by using multiple sources of evidence, having key informants review the interview protocols and study reports, pattern matching, addressing rival explanations, and by generally ensuring that each research and analysis step was structured and protocolled in such a way that it could be repeated and audited at any time. These measures ensured that the potential subjectivity of the author, for example, as a member of the Mercedes-Benz plant in Bremen, was addressed, while simultaneously ensuring the objectivity of the gathered data.

Despite the high standard maintained regarding the quality of the data collection and analysis, the grounded theory and the cases study harbor important limitations that have to taken into consideration when reviewing the results. As stated repetitively in the articles and above, the general objective is an exploratory one and does not aim at generalizability. This means that the results of the grounded theory study can be only valid – as illustrated and ensured by the above-mentioned process – with regard to the analyzed sample and the specific industry. This limitation is even more apparent in respect of the single case study. It has often been maintained that a single case study presents the researcher with the risk of gaining unique
findings that are hard to generalize, if at all. A multiple case study can usually circumvent this disadvantage (Yin, 2003).

Regardless of these obvious limitations due to the methodology, industry focus, and research objects, the author is confident that the findings of this thesis do provide the insights that answer key questions about and clarify fundamental concepts of aging workforce management by ensuring a high level of validity and reliability and that it provides original syntheses and future research issues. Consequently, this thesis meets the need for general objectivity, while the generalizability and further validity of the thesis results could be ultimately achieved through multiple studies in other industries and/or countries.
A.6. REFERENCES (INTRODUCTORY CHAPTER)


PART I

MANAGING THE AGING WORKFORCE: STATUS QUO AND IMPLICATIONS FOR THE ADVANCEMENT OF THEORY AND PRACTICE

- Published -

Authors:

Christoph K. Streb
Sven Voelpel
Marius Leibold
This paper synthesizes and translates secondary and empirical research findings on the aging workforce for the non-specialist reader, adopting a business management perspective that has to date been neglected. We chose two different approaches to review the status quo of this particular topic: First, a literature review of the Financial Times Top 40 publications, and second, a number of selected case examples that we based on our own empirical research, thereby shedding light onto the issue of aging workforce management from a practical and experiential perspective.

As a result, the paper presents findings on and conclusions about the most important future implications of the aging workforce for management.

Keywords: Aging workforce, Demographic change, Business management, Empirical research

-------------------------

B.1. INTRODUCTION

The considerable increase in the world population’s average age during the past 25 years is a scientifically acknowledged fact that is supported by a variety of statistical studies (World Bank, 1994; Government of Japan, 1999; United Nations Secretariat, 2000; European Foundation for the Improvement of Living and Working Conditions, 2003; United States General Accounting Office, 2003). These studies confirm that not only is the aggregate world population growing, but that the overall percentage of older people will increase significantly, especially in developed countries.

This demographic change has a significant impact on various dimensions of society, including the available workforce’s age composition (Leibold and Voelpel, 2006). Most notably, the shift towards an older population is mirrored in companies and organizations’ age structure. According to the Bureau of Labor Statistics, the civilian labor force aged 45
and above grew by approximately 39 percent during the last decade; the labor force over 65 years by about 25 percent, while the labor force between 25 and 29 declined slightly (Bureau of Labor Statistics, 2007). It is projected that by 2010 nearly 50 percent of the United States’ workforce will already be composed of 45 year-olds or older (Kanfer and Ackerman, 2004). In 2015 people above 55 will already comprise more than 20 percent of the overall workforce (AARP, 2004). The baby boom generation – a term that usually refers to the generation born between 1946 and 1964 – is now moving well into its fifties and will reach retirement age soon.

While an older workforce does not as such present management with any concerns, there are applicable issues and related costs that could cause companies across industries to engage into what is called aging workforce management. As Burke and Ng (2006) state, the aging of the workforce will affect organizations in various ways. On the one hand, they might lose workers and employees due to early retirement, which is still a common practice in some companies to decrease an average high age and to manage an overall surplus of personnel. This might lead to a loss of important skills and knowledge (DeLong, 2004; Dychtwald, Erickson and Morison, 2006), depending on where people have been deployed.

At the same time, the competition for high performing junior staff is expected to cause a ‘war for talent’ in some industries (Burke and Ng, 2006). From a corporate perspective, it is exactly this younger workforce shortage that might require older workers to actually stay in employment longer. Moreover, many will have to extend their working life nonetheless because their personal assets and savings are not sufficient for long retirement (AARP, 2004). For the management of affected companies, this not only means that they have to safeguard their organization against a loss of knowledge if large cohorts of experienced people were to retire, but that they also face new challenges due to increased age diversity at the workplace. This diversity means that older workers are often confronted with age stereotyping: they are
regarded as not as healthy as relatively younger workers, not as flexible or as open to change, and unable or slow to learn new skills (Chiu, Chan, Snape and Redman, 2001). Such prejudices have already been revealed as being unjustified, especially by research in the field of psychology (e.g. Beier and Ackerman, 2005). However, in industries that rely on arduous physical work, there are justified concerns regarding the older workers’ physical performance. There is, for example, evidence from the empirical research that we conducted for this article that older workers do not report sick more often than their relatively younger co-workers, but that they do indeed need more time to recover from illnesses. Moreover, with an increasing average age within organizations, the number of employees who have to be considered as constrained and unable to perform all the tasks required of them is increasing as well. Both these issues are a significant cost burden for organizations, as they have to, for example, hire additional workforce to compensate for workers who are on sick leave. In one of our case studies, the additional annual cost was estimated as approximately USD 21 million.

To summarize, the threat of losing important knowledge through retiring experts as well as the increasing number of older employees within the organization lead to financial and organizational challenges that management has to be prepared to face and cope with. To avoid the possible negative implications of an aging workforce, organizations are compelled to implement appropriate human resource measures to manage, for example, knowledge transfer between generations, or to arrange for new retirement and retaining policies, flexible work arrangements, suitable training and development, and an appropriate workplace design. It is our assumption that with the right managerial measures, a mature workforce can be as competitive as a relatively younger one.

Adopting a business management perspective, it is the goal of this paper to synthesize and translate secondary and empirical research findings about the aging workforce phenomenon...
for those readers not as yet acquainted with this topic. In the following sections, we will present the relevant literature from the Financial Times Top 40 journals, as well as a selection of practical case examples of how the aging workforce phenomenon is currently being addressed. Both the literature and examples are grouped according to the five categories of organizational actions fields proposed in Leibold and Voelpel (2006), namely ‘managerial mindset’, ‘knowledge management and learning’, ‘health management’, ‘work environment and ergonomics’, and ‘human resource management’. Subsequently, we conclude with the most prominent future implications of our findings for aging workforce management. The next section briefly illustrates the qualitative research approach that led to the identification of the specified case examples.

B.2. Research Methodology

In addition to a literature review and in order to advance our understanding of the aging workforce phenomenon in management practice, we decided to apply a research approach that is close to the actual research setting and can help to gain results for a topic that has to date been only marginally researched. Although there has been many studies on the aging of the workforce from various perspectives (e.g. Sonnenfeld, 1978; Batten, 1980; Leonard, 1989; Paul and Townsend, 1993), focusing on just a managerial perspective is new. Grounded theory is very appropriate for this kind of research setting (Eisenhardt, 1989; Miles and Huberman, 1994). Its sound and rigorous standards, as applied in our research, are described in Glaser and Strauss (1967) and Strauss and Corbin’s (1994) works. Our sample consists of 10 different industrial backgrounds: automotive, steel, aviation, food & beverages, waste management, insurance, power, high tech, mail order, and human resource consulting. In total, our sample consists of 19 companies, amongst them, DaimlerChrysler, Masterfoods, Siemens, and Volkswagen. Altogether, we conducted 46
Interviews.

In accordance with Yin’s (2003) principles, we conducted at least one or two interviews in each of the analyzed companies, preferably with experts in the field of aging from different backgrounds (e.g. management, labor union or shop committee members), using a semi-structured interview guideline (Healey and Rawlinson, 1993). The interviews were audiotaped when possible and recorded for the subsequent coding and analysis. We used cyclic reading and triangulation as the most important means of ensuring our findings’ validity (Denzin, 1978). In keeping with the recommended coding process, as described in Glaser and Strauss (1967) and Strauss and Corbin (1994), we adopted a sequence of open, axial, and selective coding.

Our database was complemented by company background information, internal and external documents (press releases, presentation slides, executive speeches, and interviews), as well as archival material. Although, according to Creswell (2003), reliability and generalizability are of less importance for the qualitative researcher, we nonetheless focused our efforts on validity and reliability, as we did not aim at generalizability as such. We ensured our study’s validity by strictly following academic transcription and documentation standards, as well as by conducting multiple iterations of our analysis. Eventually, we structured our findings according to the adapted key organizational action fields described in Leibold and Voelpel’s (2006) work on managing the aging workforce. We found the categorization into ‘managerial mindset’, ‘knowledge management and learning’, ‘health management’, ‘work environment and ergonomics’ and ‘human resource management’ appropriate and convenient for the presentation of our results. By applying these categories, we integrate our literature review and our findings in the following sections to provide an overview of the aging workforce management’s current status quo from a managerial perspective.
B.3. ANALYSIS OF THE STATUS QUO OF RESEARCH INTO THE AGING WORKFORCE

Research on the aging workforce is manifold, and always driven by the researcher’s perspective. While, for example, economists might be interested in the effects of aging on old-age social security, wages or in the value of human capital (e.g. Levine and Mitchell, 1988; Razin, Sadka and Swagel, 2002; McDonald and Weisbach, 2004), psychology – a field that traditionally seems to acknowledge age as an important factor – generally focuses on older workers’ cognitive performance (e.g. Salthouse, 1996). Although we find these scientific fields’ related findings highly valuable, our research and especially our literature review focus on publications that offer a clear and strictly management perspective. In order to identify the areas that have expanded from other scientific fields into managerial research, we decided to limit our literature review to the Financial Times Top 40 list of 2006. We chose this list as it represents those publications most commonly perceived as highly recommendable for practitioners and management researchers. We reviewed all the journals on the list between 1987 and 2007 for publications dealing with the immediate topic of managing the aging workforce. Since it is our goal to specifically look for findings that focus on management and can be applied to managerial practice, we will also present exemplary cases of various companies across industries that we identified during our own research. The intention is to ultimately obtain a thorough picture of the measures that are currently applied with regard to the aging workforce and to draw relevant implications from this review. In the following, we provide a brief overview of the most exemplary tools and measures and categorize them according to Leibold and Voelpels’ (2006) five organizational action fields. We present the literature review and empirical findings of each action field separately.
B.3.1. MANAGERIAL MINDSET

Theory. We learned from reviewing the relevant literature that the issue of managerial mindset must be approached from two directions: First, in terms of the individual employee’s mindset regarding work, and, second, in terms of organizations’ perception of older workers. Concerning the individual’s mindset, the effect of age on the perception of ethical standards is already a well-researched topic. Serwinek (1992) examined age, gender, marital status, education, dependent children status, country region, and tenure as predictors of ethical attitudes. While controlling for job status, he applied a questionnaire to a US-wide random sample of employees. In terms of the age factor, his most important finding is that older workers have greater regard for ethical standards than relatively younger ones do and are more conservative in terms of what they consider to be unethical behavior.

In the same year, Mitchell, Lewis and Reinsch (1992) published their contribution on how, besides others, attitudes are affected by demographic factors like age. Interestingly, they found that younger employees have a greater awareness of ethics than older ones. At first glance, this contradicts Serwinek’s (1992) findings. However, the authors applied a different categorization of ethical behavior and their small sample only focuses on the banking industry. Deshpande (1997) applied a questionnaire to a sample of 252 middle level managers of a non-profit organization. While acknowledging previous contradicting findings on ethical behavior and age, the author proves that an increasing conservatism with regard to an ethical perception is directly proportionate to the managers’ increasing age, i.e. older employees seem to perceive certain practices as significantly more unethical than relatively younger ones. This is also supported by Peterson, Rhoads and Vaught (2001). Their findings confirm that older professionals have a higher standard of ethical beliefs and are simultaneously less affected by external factors.

In terms of the organizational perception of older workers, Paul and Townsend (1993)
address some of the most popular prejudices regarding older workers’ performance and abilities. These include the state of their health, their assumed lack of physical and cognitive capabilities and readiness to learn new things, as well as general issues like the ‘right’ retirement age, and the need to retire at all. The authors make general suggestions on how management could change employment practices, which include the appreciation of older employees’ experience.

**Cases.** From a practical viewpoint, the issues dealing with the managerial mindset are less concerned with ethics than with organizations’ appreciation of older workers and their specific abilities. The BMW plant in Germany is a good example of such appreciation in terms of the value that older, more experienced employees can contribute to the organization. In 2005, when a new plant in Leipzig was ready to launch production, the management particularly looked for and hired workers and employees between 50 and 60 years of age. While other automotive companies tried to avoid increasing their workers’ average age, this became a goal at BMW. The organization felt that launching a new plant does not only depend on young, dynamic workers but also on the experience of an older generation, familiar with the routine and processes (Pelled, Eisenhardt and Xin, 1999; Kanfer and Ackerman, 2004).

However, the appreciation of older employees goes beyond their direct integration in the operating business. The practice of phased retirement has become widely acknowledged to allow employees to shape their own exit from their career by gradually easing their way out of full-time employment. Allowing and implementing such measures require a managerial mindset that appreciates older workers’ specific needs. When reaching the end of their working life, employees can reduce their working hours and responsibilities in keeping with their personal preferences (Levinson and Wofford, 2000).

A study found that approximately 80 percent of the baby boom generation employees are
willing to stay in the labor force beyond their actual retirement age (AARP, 2000). Adecco, the world’s largest human resource and placement service company, which is headquartered in Switzerland, offers a telling example in this context. After a successful career, one of the executives decided to retire. Right from the start, it was clear to both Adecco and the executive that although he wanted to leave everyday business gradually, it would be highly valuable if he could continue his work on some projects and continue as a key account manager for some of the most important clients, such as Volkswagen. Consequently, while he is actually retired from Adecco, as a freelance consultant, he can still offers his unique know-how and access to his network.

B.3.2. KNOWLEDGE MANAGEMENT AND LEARNING

Theory. Although employees’ continuing training and learning, regardless of their age, appear to be a crucial factor now that organizations face an aging workforce (cp. Beer, Voelpel, Leibold and Tekie, 2005; Nonaka, von Krogh and Voelpel, 2006), we identified only two articles in the Financial Times Top 40 list that directly refer to this issue. Maurer and Rafuse (2001) presented their viewpoint with a practical example: What if aging employees were to start filing age-discrimination suits against companies because their access to training is limited or denied outright? The authors believe that this scenario could become a reality in future. They approach the topic by first examining a behavioral perspective and then a legal one. Their final recommendation is to treat employees individually, regardless of age, and to acknowledge their individual training needs.

While this article is a plea for increasing the awareness that an aging workforce’s training and developing needs are equal to those of a relatively younger one, Maurer, Weiss and Barbeite (2003) propose a hypothesis sequence ranging from workers’ age, to benefits to participating in training, attitude towards training and intentions regarding actual participation. The authors
differentiate between chronological age and perceived relative age. The results seem to prove that age negatively affects the variables that lead towards participation in training and development. However, belief in the potential benefits of training as well as self-efficacy can counteract this effect. Individuals who have been involved in training measures before and who receive the necessary support from their environment, are more likely to participate regardless of their individual chronological age. A study of the automobile industry proved that discarding age limits with respect to education and training resulted in an approximately 20 percent increase in productivity – even before any training had taken place. Mature age groups therefore reveal a verifiable interest in learning and training (Maurer and Rafuse, 2001). As the basis of employees’ lifelong learning, further training and education are an important prerequisite for improving the organizational knowledge base. The goal is to avoid any age limits, or similar age-related hurdles, and to offer training that is suitable for the targeted age group.

**Cases.** In managerial practice, the important issue in respect of knowledge management and learning is the retention and intergenerational transfer of important know-how and skills. At the dawn of the e-commerce era, General Electrics (GE) already matched ‘junior managers’ with ‘senior managers’ by getting them to meet for two to four hours every week in order to exchange knowledge and experience. This provided the older employees with an update on new information and skills – at this time mainly about the rise of the World Wide Web – and introduced the younger employees to a network of seniors. This transfer of knowledge and ‘deep smarts’ (Leonard and Swap, 2004) would have been impossible to achieve under normal working conditions.

LVM, a German insurance company, developed very good training methods that were consciously applied across all age groups. One program, for example, aimed at familiarizing all employees with the use of multi-media training methods. All employees were allowed to
apply for a free laptop for personal use as well as training, during which they were taught how to use these new tools in pursuit of their individual learning process. This significantly increased the usage of this technology for training purposes as well as peoples’ personal responsibility for increasing their skills. This outcome is in accordance with Deutsche Lufthansa’s experience. In this company, e-learning has experienced a revival, as it helps older employees to overcome specific hurdles regarding their learning needs.

Another important tool for enforcing learning is job rotation. This can take place between different workstations, departments and/or plants within a company, as well as between companies (Campion, Cheraskin, and Stevens, 1994; Denison, Hart and Kahn, 1996). The most advanced example is the Siemens PeopleShareNet database that is used to worldwide deploy experts company wide, thus fostering knowledge transfer (Voelpel, Dous and Davenport, 2005). Job rotation has been a common practice on DaimlerChrysler’s production lines. This has not only relieved the monotony of work sequences, but has also increased the workers’ flexibility in terms of their fields of application. Job rotation between organizational units and plants helps to transfer knowledge quickly throughout the company. Today, this approach serves as a model for all knowledge-intensive tasks at DaimlerChrysler, especially those involving expert knowledge, which is hard to quantify. To ensure that such know-how is transferred from one generation to the next, job rotation is compulsory for all age groups.

Siemens too, has a highly developed knowledge transfer process that can be applied to manage the aging workforce. In a process called Leaving Expert Debriefing (LXD), critical knowledge – such as individual related knowledge, network knowledge, knowledge partners and teams as well as all forms of codified knowledge – is first identified. Thereafter, a decision is made on the way that this knowledge should be transferred to the expert’s successor. This process is led by a moderator who also coordinates the transfer process in the form of interviews, tandem activities, and various forms of trainings.
B.3.3. HEALTH MANAGEMENT

Theory: Our literature review revealed that there is surprisingly little in the Financial Times Top 40 list of journals on an aging workforce’s health management. This is mainly due to these publications’ business focus, which does not necessarily include that specific area. We consequently strongly encourage more managerial research studies focusing on an aging workforce’s health management. Nevertheless, our literature review identified some publications that at least partially cover issues that may be relevant in this regard.

Cropanzano, Rupp and Byrne (2003) conducted an interesting study on the relationship between emotional exhaustion and job performance as well as organizational citizenship behavior. They found that as a criterion for job performance, emotional exhaustion goes beyond factors such as age. The authors therefore conclude that age alone is not a sufficient criterion on which to base performance or to determine burn-out syndrome in employees.

DeGroot and Kiker (2003) conducted a meta-study on employee health management programs’ (EHMP) general effects on not only general health and well being, but also on performance, job satisfaction, absenteeism, and voluntary turnover. Although, the authors do not specifically consider age in their study, their findings surprisingly suggest that such programs are generally unrelated to job performance and are negatively related to absenteeism, unless the program is compulsory. There is only a slight relation to job satisfaction and turnover. These findings clearly question the effectiveness of such programs and raise question of what else management should do to positively influence employees’ health, performance and commitment to the organization.

Even though this literature review is limited, we would strongly recommend that studies be done that go beyond the physical factors of health management and are combined with psychological factors.

Cases. Contrary to what the few related articles suggest, employees in advanced age
groups’ increasing health problems is one of the most important reasons for companies to integrate health management into their aging workforce management efforts. BMW, DaimlerChrysler and E.ON, the leading global power and gas company, are popular examples of organizations that manage health preemptively by combining fitness and sports offerings with health education and training, as well as emphasizing the workers’ responsibility for their well-being. Their health management also includes regular health checks and, for example, annual influenza vaccinations. Since back problems and monotonous strain could easily lead to serious physical problems in an older workforce, job rotation and a mobile computer-aided training unit were introduced at DaimlerChrysler. Specifically designed for the training of back muscles, employees use the unit during regular working hours. This system is supported by a computer analysis of employees’ muscular fitness and the company, besides ensuring regular job rotation, checks for the most common health problems arising from production lines, especially those usually associated with an older workforce.

‘Matching’ is one of the most promising tools in aging workforce management to be implemented at corporations such as DaimlerChrysler and Volkswagen. Basically, it means matching individual employees with the most suitable workplace, according to his or her physical capabilities and training. This approach assumes that all workers, regardless of age or physical handicap, can do a job that adds value to the company’s processes and products if one is aware of their specific abilities. Both DaimlerChrysler and Volkswagen try to assign workers to the right job by assessing their physical and training capability data and using simple computer software that will do the matching. Elsewhere, companies simply use Excel sheets to match employee data with a suitable workplace.
B.3.4. WORK ENVIRONMENT AND ERGONOMICS

Theory. The issue of work performance with regard to work environment and ergonomics is a widely researched field of interest. For the purpose of our literature review, we briefly present only those publications that are most relevant for managerial research. Harpaz (1990) analyzed workers’ expectations and their effect on the workers’ performance. In general, ‘interesting work’ and ‘good pay’ were the most dominant issues influencing work performance. However, older employees (over 50) specifically ranked ‘interpersonal relationships’ as an important factor. McEvoy and Cascio (1989) conducted a very interesting study on the correlation between age and performance. Applying a meta-analysis of 96 independent studies, the authors found that there is no interrelation. Moreover, neither the type of performance measure nor the type of job has a moderating effect. Avolio, Waldman and McDaniel’s (1990) work support these findings. They emphasize experience over age in terms of predicting job performance. In contrast to McEvoy and Cascio (1989), however, they prove that the type of occupation has a moderating effect.

As early as the 1990s, Hall and Richter (1990) proposed some important implications for human resource management who deal with the ‘baby boomer’ generation. Having taken the older cohorts’ ability to perform well into account as well as the assumption that their vertical career opportunities are shrinking, they advised organizations to empower these employees to develop themselves ‘psychologically’ to take advantage of their potential. They even presented a suitable toolbox of organizational measures with which to do so.

Cleveland and McFarlane Shore (1992) took a very detailed approach when analyzing the relationship between age and performance. They categorized the age factor into chronological age, employee subjective age, social age (age perceived by others), as well as the employee’s own and his/her supervisor’s perception of his/her age compared to that of his/her colleagues. According to their results, it seems that chronological age can only be used to determine work
variables like performance when applied with other, contextual measures of age.

Pelled, Eisenhardt and Xin (1999) researched the relationships between diversity, conflict, and performance in a team setting. Assuming a linkage between diversity, conflict and, eventually, performance, their results indicate that age diversity in teams is negatively related to conflict and is therefore of no significant threat to team performance.

May, Reed, Schwoerer and Potter (2004) took an ergonomic perspective of the issues of age and work performance. They investigated different age groups’ perception of workplace improvements in offices, assuming that such improvements could positively affect older employees’ employment opportunities. Surprisingly, their findings suggest that older employees are less affected by these improvements. Human resource managers may therefore have to examine other factors to improve older employees’ work satisfaction.

Kanfer and Ackerman (2004) take a theoretical perspective of the aging of the workforce. They aim to extend work motivation theories by taking adults’ life-span development during their career into account and thereafter deducing implications for further research. Treadway, Ferris, Hochwarter, Perrewé, Witt and Goodman’s (2005) study proposes that age has a moderating effect on the perception of organizational politics and work performance. Their results, which are based on three independent studies, conclude that age is indeed a moderator.

Cases. In management practice, ergonomics, which is closely related to preventive health measures, is present across all industries. Whether on production lines or in offices, the workplace has to be designed in such a way that workers, regardless of their age, can perform their assigned tasks with maximum efficiency and minimum unnecessary physical strain. We know from our own research that although ergonomics is a topic as mature as work science itself, there are concerns that workplaces are still designed for younger, physically fully capable workers and do not meet an older workforce’s needs. When BMW’s new 3 series
was launched in Munich, Germany, the company invested 25 million Euros in one plant alone to ensure that the new workplace’s design would meet all the prerequisites of age-adequate ergonomics. To avoid long-term physical harm to workers and to allow the growing number of physically constrained workers to perform according to value-creating standards, they introduced height adjustable workplaces and conveyor belts at face level. These concerted measures on both the health management and ergonomic level can significantly contribute to a physically more capable workforce despite its increasing average age.

Coors Brewery, the third largest brewer in the U.S., provides an example of how to measure the success rate of these approaches. Through its efforts to improve employees’ health and ergonomics, Coors reduced long-term illnesses by 66 percent during 2003 and 2004. It furthermore significantly increased the number of workers recovering from long-term illnesses during the first year, thus achieving cost savings of millions of dollars for the company.

B.3.5. HUMAN RESOURCE MANAGEMENT

Theory. Obviously, when it comes to the topic of the workforce’s average age increase, retirement and related issues are of great importance for human resource management. The first work within the last 20 years that we identified from the Financial Times Top 40 list approaches early retirement from three different perspectives. In times when retirement does not necessarily mean the absolute end of all employment, Feldman (1994) suggests using a decision-tree framework to explain the process of deciding on whether to retire early, accept bridge employment, or accept bridge employment in another industry or even in another occupation. He proposes a number of hypotheses for further theory development on how and why people might want to make these decisions along this process. The issue of bridge
employment was further investigated in Kim and Feldman’s (2000) study of professors leaving the University of California on early retirement during the early 1990s. Their findings suggest that health, tenure, as well as a working spouse and dependent children are positively related to the acceptance of bridge deployment. They also proved a positive relationship between bridge employment and retirement satisfaction, as well as overall satisfaction with life after retirement.

We found a similar plea for flexible retirement due to its potential benefits in Levinson and Wofford’s (2000) article, in which they advise both executives considering retirement as well as organizations whose managers are retiring. Basically, they recommend proactive engagement in new activities during this phase of newly won freedom and highlight how to deal with potential conflicts between predecessors and successors on an organizational basis.

A specific appreciation of older workers and employees’ experience as well as of their value for the organizations can be found in Dychtwald, Erickson and Morison (2004). They demand a ‘culture that honors experience’, and a change in recruitment and training practices. They suggest flexible work practices and phased retirement in order to benefit from employees’ knowledge and to ease their move into a ‘new period of life’ and continued societal value-added.

Cases. In managerial practice, recruiting is as important a human resource issue as flexible work times. Globalization has made the worldwide market for skilled employees more competitive, which will inevitably complicate the transfer of knowledge. Despite the supply of well-educated and trained graduates from China and India, many companies in industrialized countries will experience increasing difficulties in hiring the best people (Davenport, Prusak and Wilson, 2003a; Davenport, Prusak and Wilson, 2003b). Masterfoods, one of the largest companies in the food industry, and OTTO, the world’s largest mail order business, meet this challenge by already concentrating their efforts on
recruiting the next generation of ‘high potentials’ to replace their aging workforce. They explain that although the recruiting of top people has always been difficult in their industries, the shrinking supply of younger employees, which typifies the demographic change in Europe, is intensifying the situation dramatically. They have already declared a new ‘war-for-talents’. Simply offering the highest remuneration will not be enough to win this war. Research indicates that besides a comparable salary, it has become crucial to offer employees interesting career development perspectives and an opportunity for self-actualization (Zack, 1999; Davenport, Thomas and Cantrell, 2002).

Another practical human resource management tool in the field is mentoring. As part of companies’ succession planning, mentoring can be applied to ensure that important knowledge is transferred directly from the predecessor to the successor, similar to the above-described training and development tools. Michelin, the French tire manufacturer, calls this process “doublage”, which refers to an advanced model of succession planning. Those employees who hold specific valuable knowledge about a product are allowed to choose their own successors. Only a few critical key positions are centrally controlled. In this close relationship between master and novice, ‘deep smarts’ (Leonard and Swap, 2005) can be transferred, thus preserving it for the company.

**B.4. SYNTHESIS AND DISCUSSION OF FINDINGS**

Table B.1 is a summary of our findings as described in the above analysis of the status quo of aging workforce management. Both our literature review and case examples are as exhaustive as possible for purpose of a valid scientific status quo review. However, a number of articles that we found during our review did refer to the aging workforce from various perspectives, but did not have a specific business management focus. In the field of economics, for example, Levine and Mitchell (1988), Razin, Sadka and Swagel (2002), and McDonald and
Weisbach (2004) cover issues such as the impact of workforce aging on relative wages, intra- and intergenerational transfer of social welfare, and the development of human capital. Lévesque and Minniti (2006) explain why younger individuals are more likely to engage in entrepreneurial activities, while Ostroff and Atwater (2003) prove that age does effect employees’ remuneration. We deliberately limited our scope to the Financial Times Top 40 journals as from 1987 in order to identify publications that have the most important value for the business-oriented reader. Thus, from the publications that we reviewed above, we deduce a number of findings that might be important.

Table B.1. Status Quo Overview.

<table>
<thead>
<tr>
<th>Action Fields</th>
<th>Articles</th>
<th>Selected Case Examples</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial Mindset</td>
<td>Serwinek, 1992; Mitchell, Lewis and Reinsch, 1992; Deshpande, 1997</td>
<td>BMW, Adecco</td>
<td>Deals with the mindset of employees towards work and organizations towards older employees</td>
</tr>
<tr>
<td></td>
<td>Peterson, Rhodes and Vaught, 2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Management and Learning</td>
<td>Maurer and Rafuse, 2001; Maurer, Weiss and Barbeite, 2003</td>
<td>General Electrics, LVM, Lufthansa, Siemens, DaimlerChrysler</td>
<td>Deals with older employees' ability to learn and organizations ability to retain and transfer knowledge between generations</td>
</tr>
<tr>
<td>Health Management</td>
<td>Cropanzano, Rupp and Byrne, 2003; DeGroot and Kiker, 2003</td>
<td>DaimlerChrysler, BMW, E.ON, Volkswagen</td>
<td>Deals with the preservation and strengthening of the physical performance of older employees</td>
</tr>
<tr>
<td>Human Resource Management</td>
<td>Feldman, 1994; Kim and Feldman, 2000; Levinson and Woford, 2000</td>
<td>Masterfoods, OTTO, Michelin</td>
<td>Deals with the adaption and implementation of typical human resource management tools to face the challenges of the aging workforce</td>
</tr>
<tr>
<td></td>
<td>Dychtwald, Erickson and Morison, 2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Environment and Ergonomics</td>
<td>Harpaz, 1990; McEvoy and Cascio, 1989; Avolio, Waldman and McDaniel, 1990</td>
<td>BMW, Coors</td>
<td>Deals with the implications for organizational environment and ergonomics with regard to the aging workforce</td>
</tr>
<tr>
<td></td>
<td>Hall and Richter, 1990; Cleveland and McFarlane Shore, 1992; Pelled, Eisenhardt and Xin, 1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>May, Reed, Schweizer and Potter, 2004; Kanfer and Ackerman, 2004; Treadway, Ferris, Hochwarter, Perrewé, Witt and Goodman, 2005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First, it seems that retirement is a well-researched topic and that there is common agreement that a flexible or phased retirement can be beneficial for both the individual and the organization. The employee can slowly adjust to his/her new life perspectives, while the company does not lose important skills and experience overnight. However, organizations have to allow and implement the appropriate policies and measures, as well as an appropriate cultural mindset. Surprisingly, there is also wide agreement in terms of older workers’
performance. There seems to be no scientific proof that an older workforce is less productive than a relatively younger one. It also seems that the right organizational measures play an important role in maintaining the workforce’s performance. Training and development still are issues that require human resource management to integrate employees regardless of their age and according to their individual needs. After all, research has shown that older employees have significantly higher ethical standards than younger ones and this is beneficial for any organization.

Finally, with regard to the literature review, it is striking that so few publications were found on an aging workforce’s health management. This might not be a common topic in managerial literature, but we believe that the gap between the indications found in the literature and this topic’s relevance as concluded from our case studies, reveals that increased future efforts are required to translate specific research findings for the business reader.

The presented case examples suffer from the same limitations that apply to the literature review. The described tools and measures employed in aging workforce management are not exhaustive. There might be other tools that are applied in specific environments or domains that have not been mentioned in this overview. Moreover, the described examples are limited to the mentioned industries and companies. Different businesses might have different challenges with regard to the aging workforce and might require different approaches. Nonetheless, we believe that we have gained important insights. None of the described tools were initially designed to specifically deal with an aging workforce. Measures such as health management, ergonomics, recruiting, training, job rotation, mentoring, and even phased retirement have obviously been applied in organizations for decades, long before demographic change became a reality. Physical health and knowledge management have always been important topics and do not necessarily relate to the workforce’s age. These findings therefore indicated that despite the recommendations and implications that we found
in the literature and empirical research, there is still a significant research gap in terms of how management should directly approach the aging workforce. There seems to be a serious lack of specific, age-related tools in management.

To sum up, the general perception that we gained of the aging workforce during our research is very positive. Given the right circumstances, older workers seem to be sufficiently flexible and willing to be as productive as their relatively younger colleagues. Moreover, they are willing to accept flexible retirement towards the end of their active working life and have higher ethical standards. However, as pointed out in some publications, this is only true if management can provide the necessary organizational environment and mindset, as well as appropriate managerial measures. The importance of organizational environment and mindset is also supported by our empirical research. We believe that the well-known tools described in the case examples can only successfully counteract the potential downsides of an aging workforce if the organization has the right mindset supported and guided by appropriate leadership. If all organizations were to be aware of this, the already adapted aging workforce management tools could not only be more successfully implemented, but new tools, specifically designed to manage older employees, could be ultimately developed.

In order to advance our understanding of related issues, we would like to propose that practitioners and researchers alike deal with and answer the following questions:

1. What are an older workforce’s potential performance weaknesses and strengths with regard to specific industries and occupations?

2. What new and specific tools have to be developed to counteract an older workforce’s potential downsides and to leverage its potential advantages?
3. How does an appropriate organizational mindset and leadership influence the effectiveness of existing measures with which to manage the aging workforce? How does this affect the development and implementation of new, specific tools?

**B.5. CONCLUSION**

The aging of the global workforce is a demographic development that will have a significant impact on the living conditions and corporate environments in societies throughout the globe. As stated at the beginning of this article, it is our aim to synthesize and translate secondary and empirical research findings on the aging workforce for the non-specialist reader. We consequently adopted a business management perspective as this has been neglected to date and chose a qualitative approach based on two sources: First, an overview of the most important related publications from the Financial Times Top 40 list of journals, and, second, our own case research findings by summarizing the most important practical tools in aging workforce management.

Our findings from the literature review suggest that although there is research on specific aging workforce issues, a specifically integrated business management perspective is still lacking. In view of the global demographic and competitive realities, this perspective is crucial to advance our understanding of successful aging workforce management and related issues. Contrary to managerial research, our empirical case research approach and findings prove that in some industries and companies, management has already started to react to the demographic challenge. The managerial tools that have been described in this paper have not as yet been widely introduced, but are based on the experience of a limited number of companies incorporated in our research. Further and more extensive research is now required to validate these approaches and tools.
B.6. REFERENCES


PART II

AGING WORKFORCE MANAGEMENT IN THE AUTOMOBILE INDUSTRY: DEFINING THE CONCEPT AND ITS CONSTITUTING ELEMENTS

Authors:

Christoph K. Streb
Sven Voelpel
Marius Leibold
This paper presents the results of a grounded theory study on the automobile industry aimed at developing a concept of aging workforce management by identifying and constructing its constituting elements. Through an in-depth research investigation, it answers the question of how the challenge of managing an aging workforce can be defined, and the related broader managerial issues that arise in the context of one specific industry.

Our findings suggest that the quest for ‘competitiveness’ is the major constituting element of the concept of aging workforce management. Interdependent on this are two secondary elements that encompass the actual challenge: measures that drive competitiveness and symptoms of the aging workforce. Three further ‘residual elements’ make up the six constituting elements of the construct. Issues for future research are suggested, including extending such studies into other industries, and operationalizing the construct of aging workforce management by explicating the dynamics between its constituting elements.

Keywords:
Aging Workforce Management; Grounded Theory; Automobile Industry

C.1. INTRODUCTION

Together with the globalizing nature of the worldwide economy, the aging of the workforce is recognized as one of the most significant factors to affect organizational reality in many industrialized countries. This is unlikely to change in the foreseeable future (DeLong 2004; Dychtwald/Erickson/Morison 2006; Leibold/Voelpel 2006; World Bank 1994). Whereas
within the traditional managerial mindset, globalization requires organizations to perpetually compete in terms of performance indicators such as productivity, efficiency, increased cost advantages, as well as superior products – i.e. they have to strive for increased competitiveness (Krugman 1995) – the aging workforce adds a challenging new aspect: Management is becoming concerned with workers’ physical and mental performance, specifically that of employees beyond the age of 45. Academic researchers, too, wonder whether an older workforce can perform exacting physical and mental tasks as productively and efficiently as a relatively younger one.

Questions such as these have led to an increasing number of companies introducing of what is called ‘aging workforce management’. This basically refers to the development, implementation, and application of tools and measures to sustain or even improve organizational competitiveness, despite an increase in the workforce’s average age and its resulting age-related challenges.

While there have already been multiple research studies into the older workforce’s mental and physical abilities (e.g. Delgoulet/Marquie 2002; Freudenthal 2001; Reed/Doty/May 2005), our literature research indicates that there is a substantial gap in both managerial practice and research regarding what aging workforce management actually constitutes (Streb/Voelpel/Leibold 2008). Aging still seems to be a conundrum for most organizations and they consequently apply conventional management tools to its anticipated challenges.

In view of the automobile industry’s specific concern about physical job performance, we applied a grounded theory approach to answer the questions of what elements actually constitute aging workforce management, i.e. how the challenge of the aging workforce can be defined, and what the specific related issues are with which management has to deal.

Grounded theory is perceived as being especially useful in areas of study where little scientific work has been conducted, and when the research lacks specific theories on which to
build – as in our research topic (Charmaz 2005; Goulding 1999). Our findings will therefore serve as a basis on which to build further, more specialized research.

Our work is presented in four main sections. In the first, we provide the reader with a literature review to illuminate the existing research gap in aging workforce management. In the second, we describe the applied grounded theory methodology and provide details of the data collection and analysis. The third section presents our results as we answer the research questions and the further managerial issues arising from them. Finally, we provide suggestions for further research into the construct and dynamics of aging workforce management.

C.2. RESEARCH GAP

Research on older workers is manifold and stretches across various disciplines. Psychology, for example, seems to be a field that is particularly interested in aging, especially with regard to cognitive performance (e.g. Salthouse 1996). However, as implied in the introduction, there is a significant gap regarding research on the aging workforce from a management perspective.

When reviewing the relevant studies, it becomes apparent that the increasing average age of the available workforce has changed society (Bureau of Labor Statistics 2007; United States General Accounting Office 2003). The potential related challenges have also been predicted for years - even in management research (Batten 1980; Leonard 1989; Paul/Townsend 1993; Sonnenfeld 1978). Basically, the current literature can be categorized into two general categories: those concerned with the loss of knowledge that might result employees moving into retirement en masse and those dealing with the potential physical shortcomings of older workers.

DeLong (2004) has provided seminal research on the loss of knowledge. By starting with
practical examples from business where the retirement of experienced workers and employees is already threatening the loss of important know-how, he develops approaches with which to react to the challenge. Congruent with this work, Dychtwald/Erickson/Morison (2004; 2006) ask that current retirement practices be reconsidered and emphasize the potential future shortage of skills and talent. Influenced by studies such as these, some authors insist that age stereotypes should be abandoned and that the value to appreciate older employees can add to the organization be appreciated (e.g. Beier/Ackerman 2005; Chiu/Chan/Snape/Redman 2001). Paul/Townsend’s (1993) study is a popular example of works that challenge common myths about the aging workforce and provide suggestions on how to employ them appropriately.

Various studies on the employed older workforce argue that there is no significant decline in older employees’ mental skills – provided appropriate training is given – although physical job performance does decrease significantly with age (e.g. Kanfer/Ackerman 2004; McEvoy/Cascio 1989; Waldmann/Avolio 1986). This implies that in an industry, such as the automobile industry, that relies on physical labor to a significant extent and on which we focus in this article, an aging workforce does indeed threaten competitiveness (e.g. Avolio/Waldmann 1990; Avolio/Waldmann/McDaniel 1990; Davidson/Worrell/Fox 1996; Lawrence 1988).

Even though workstations’ ergonomic quality has significantly improved in automobile production (as well as in most other industries), thus making physical production tasks more efficient (Genaidy/Salem/Karwowski/Paez/Tuncel 2007), the aging workforce’s physical job performance and its influence on competitiveness are still its most important concerns. This is despite the undisputed importance of knowledge workers in a global knowledge and innovation-driven economy. This is also widely acknowledged in management research studies (Davenport/Leibold/Voelpel 2006; Lam 2000; Leibold/Probst/Gibbert 2002).
While the identified works are highly valuable they fail to identify what actually constitutes the challenges behind an older workforce and how these should be addressed in practice. This research gap clearly calls for academic research to explore aging workforce management. In the following section, we introduce our research approach, which answers this call.

C.3. RESEARCH METHODOLOGY

Glaser/Strauss (1967) define grounded theory as the “discovery of theory from data systematically obtained from social research” (p.2) and propose a comparative method for developing theory that is rooted in symbolic interactionism (Goulding 2000; Suddaby 2006). This includes an inductive approach, which allows theory to evolve during the actual research via a process of constant (comparative) analysis and data gathering (Charmaz 1983; Glaser 1998; Strauss 1987; Strauss/Corbin 1994). This qualitative research approach is suitable for novel topics as it requires a high level of testability and empirical validity (Eisenhardt 1989), especially where people’s different viewpoints need to be integrated and where there are causal interferences in the specific local and cultural contexts (Miles/Huberman 1994). There are several reasons why this approach was followed to answer our research question:

In the automobile industry, the topic of the aging workforce is generally a sensitive one, as it touches on controversial human resource management objectives during times of cost saving and personnel backlogs. The topic is also still relatively new on most organizations’ managerial agenda – despite decades of research – (e.g. Batten 1980; Leonard 1989; Paul/Townsend 1993; Sonnenfeld 1978) and we therefore did not expect to find elaborated and detailed information.

Under these circumstances, it is difficult to isolate and identify organizational practices by means of conventional, quantitative research methods. Identifying the constituting elements
of aging workforce management would therefore require a specific research approach that would allow the researcher to actually enter the world of the object or individuals under study. This would allow interactions to be interpreted, facilitate theory building, and allow an analysis of the underlying human interaction processes (Goulding 1999; Hutchinson 1993; Strauss/Corbin 1994). Grounded theory research meets all these criteria. In consideration of the width and breadth of the available data, we consequently applied the basic methodological concept of open, axial, and selective coding.

C.3.1. THE SAMPLE

The importance of the sample for the results of our research approach cannot be underestimated (Miles/Huberman 1994). In grounded theory, sampling is understood as theoretical sampling as apposed to statistical sampling (Ragin 1994). Therefore, triangulation during the analyzing process will itself determine sample size and depth. The process of sampling ends when the data are saturated, i.e. when no new findings can be derived from additional information and increasing the sample would not provide any new insights.

In order to deepen our understanding of the essential constituting elements of aging workforce management in the automobile industry, we contacted well-known manufacturers in the major European car producing nations. After gaining access, we talked to managers, union representatives, and common employees. The choice of interviewees initially depended on whom the organization regarded as an expert in the specific field and who would subsequently be recommended by the interview partners as a continuative and valuable source of information with regard to the specific issues emerging during the actual interview. This is in accordance with Glaser and Strauss’s paradigm of theoretical sampling, which, through the crystallizing theory characterizes the process of data collection as “controlled” (Glaser/Strauss 1967). We were often limited to one or two people in a specific organization,
although, in one case, we were able to gain access to several interviewees in one producer’s various plants.

Table C.1 provides an anonymized overview of the interviewees, their function, department and their affiliation. Altogether, we conducted 30 interviews in thirteen different facilities. This included major automobile manufacturers, as well as smaller, mostly handcrafting, automobile producers.

<table>
<thead>
<tr>
<th>Interview Code Number</th>
<th>Function of Interviewee</th>
<th>Department of Interviewee</th>
<th>Organization of Interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1</td>
<td>Staff Manager</td>
<td>Human Resource Management</td>
<td>DaimlerChrysler Sindelfingen</td>
</tr>
<tr>
<td>n2</td>
<td>Operations Manager</td>
<td>Human Resource Management</td>
<td>Aston Martin Lagonda Ltd.</td>
</tr>
<tr>
<td>n3</td>
<td>Company Medical Officer</td>
<td>Health Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n4</td>
<td>Operations Manager</td>
<td>Production</td>
<td>Karmann AG Osnabrück</td>
</tr>
<tr>
<td>n5</td>
<td>Head of Department</td>
<td>Human Resource Management</td>
<td>BMW Leipzig</td>
</tr>
<tr>
<td>n6</td>
<td>Staff Manager</td>
<td>Human Resource Management</td>
<td>Rolls-Royce Motor Cars Westhampnett</td>
</tr>
<tr>
<td>n7</td>
<td>Plant Manager</td>
<td>General Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n8</td>
<td>Head of Department</td>
<td>Human Resource Management</td>
<td>Aston Martin Lagonda Ltd.</td>
</tr>
<tr>
<td>n9</td>
<td>Company Medical Officer</td>
<td>Health Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n10</td>
<td>Staff Manager</td>
<td>Human Resource Management</td>
<td>DaimlerChrysler Rastatt</td>
</tr>
<tr>
<td>n11</td>
<td>Staff Manager</td>
<td>Human Resource Management</td>
<td>Karmann AG Osnabrück</td>
</tr>
<tr>
<td>n12</td>
<td>Employee</td>
<td>Works Council</td>
<td>Adam Opel AG Rüsselsheim</td>
</tr>
<tr>
<td>n13</td>
<td>Staff Manager</td>
<td>Human Resource Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n14</td>
<td>Foreman</td>
<td>Production</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n15</td>
<td>Head of Department</td>
<td>Human Resource Management</td>
<td>DaimlerChrysler Rastatt</td>
</tr>
<tr>
<td>n16</td>
<td>Company Medical Officer</td>
<td>Health Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n17</td>
<td>Company Medical Officer</td>
<td>Health Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n18</td>
<td>Head of Department</td>
<td>Human Resource Management</td>
<td>Volkswagen AG Wolfsburg</td>
</tr>
<tr>
<td>n19</td>
<td>Employee</td>
<td>Health Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n20</td>
<td>Head of Department</td>
<td>Logistics</td>
<td>McLaren Technology Center Woking</td>
</tr>
<tr>
<td>n21</td>
<td>Head of Department</td>
<td>Human Resource Training</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n22</td>
<td>Worker</td>
<td>Maintenance</td>
<td>GM Powertrain Kaiserslautern</td>
</tr>
<tr>
<td>n23</td>
<td>Staff Manager</td>
<td>Human Resource Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n24</td>
<td>Employee</td>
<td>Quality Management</td>
<td>GM Powertrain Kaiserslautern</td>
</tr>
<tr>
<td>n25</td>
<td>Employee</td>
<td>Health Management</td>
<td>Volkswagen AG Braunschweig</td>
</tr>
<tr>
<td>n26</td>
<td>Head of Department</td>
<td>Health Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n27</td>
<td>Staff Manager</td>
<td>Operations Management</td>
<td>DaimlerChrysler Bremen</td>
</tr>
<tr>
<td>n28</td>
<td>Employee</td>
<td>Works Council</td>
<td>GM Powertrain Kaiserslautern</td>
</tr>
<tr>
<td>n29</td>
<td>Company Medical Officer</td>
<td>Health Management</td>
<td>DaimlerChrysler Mannheim</td>
</tr>
<tr>
<td>n30</td>
<td>Head of Department</td>
<td>Human Resource Management</td>
<td>DaimlerChrysler Sindelfingen</td>
</tr>
</tbody>
</table>
differing impacts. We, for example, explicitly presumed that employees of smaller handcrafting producers face different physical work demands than those working for mass producers.

C.3.2. PARTICIPANT OBSERVATION

Early in 2005, we chose one large automobile manufacturer for an in-depth preliminary data gathering, not only in terms of interviews conducted but also in terms of our personal involvement within the organization (Jorgensen 1989) by means of participant observation. The advantage of participant observation is that it allows meanings and perspectives to be better identified and evaluated than other research methods (Snow/Thomas 1994). Moreover, the researcher is closer to the phenomenon being analyzed, while simultaneously maintaining a professional distance (May 1997). Furthermore, the phenomenon can be studied in real time, in its actual organizational context (Emory/Cooper 1991).

As an official part of the organization, but with a clear focus on passive observation (Dane 1990), one of this paper’s authors worked for a time as a blue-collar worker on one of the large car manufacturers’ production lines. In order to personally experience the ‘whole picture’, the author gradually moved up the hierarchical levels within the organization. On a team leader level, he moreover participated in and observed lean-production projects and the introduction of new assembly line procedures focused on the aging workforce. Ultimately, he joined the actual project management team that manages and controls the application of aging workforce measures at the plant and headquarters level. Consequently, we were able to gain particularly valuable insights into this specific company’s organizational structures and culture, as well as insights into the actual implementation of aging workforce management in the automobile industry.
C.3.3. THE INTERVIEWS

The semi-structured interview guideline that we applied for the data collection was the result of our participant observation at one of the sampled organizations and a related literature review prior to the actual interviews. With this guideline, and in accordance with Yin’s (2003) principles, we interviewed managers, union and/or shop committee members, and workers (Healey/Rawlinson 1993). Since we wanted to avoid bias in the context of sensitive human resource management issues, we abstained from audiotaping most of the interviews to benefit from a more comfortable and upfront interview atmosphere. The interviewees appreciated this approach greatly. We did, however, make a record all of the interviews immediately afterwards and filed a complete protocol for the subsequent coding and analysis with the help of notes taken during the interview.

In our interviews, we first attempted to discover to what extent the aging of the workforce is already perceived as an organizational challenge, and how the topic is operationalized, if at all. The questions that we asked ranged from whether there would in fact be a demographic change in the workforce, how this would be operationalized in everyday business, how the general awareness of the topic was perceived, whether it received top management attention, whether it had been introduced to the organization top-down or bottom-up, whether the physical or the knowledge dimension was at the forefront of concern, whether a specific toolbox had been developed to manage the topic, and the status of related projects.

From there, we moved our investigation into the fields of strategies, organizational practices and tools aimed at managing the problems associated with this particular demographic change. We identified major organizational drivers and hurdles of this topic, as well as other key indicators that might give us a picture of how this challenge is being addressed and what the status of relevant projects was. We assumed that we would better understand how the aging workforce was actually managed if we knew more about the people and/or the
circumstances that consciously and subconsciously drive or hinder it. We also wanted to know more about the relationship between unions and management with regard to this challenge, exactly what procedures were being implemented, and how the implementation process was proceeding in terms of scheduling and milestones. We were also interested in how this process could be improved, and if there was an example of best practices within the organization. The question regarding awareness of the challenges facing older employees was especially important. At the end of each interview, we gave the interviewees an opportunity to talk about what actions they would take if they were free to do so.

In order to facilitate a deeper understanding of the gained insights and to further refine our actual research design and data-collecting process, we actually started the analysis of our data during the data-gathering period and we tried to deepen our understanding of the specific circumstances by moving from obvious observations and the surface of the problem towards the hidden topics and issues that surround this phenomenon.

Some companies agreed to an interview, although the aging workforce was not yet on their organizational agenda. If our initial question of how this topic was perceived and addressed uncovered that there was no problem or challenge, we – as in the above-mentioned approach – analyzed this response by identifying specific organizational circumstances that could explain this. These interviews turned out to be equally valuable and enlightening to our research as the others, for they allowed us to draw potential conclusions regarding the different issues faced by the different companies. Whatever the case, our visits and appointments included an in-depth observation of the actual production line.

C.3.4. DATA ANALYSIS

Our qualitative research design worked very well in this specific environment (Glaser/Strauss...
Since most of the data sought was qualitative, we used triangulation as one of the most important means of ensuring our findings’ soundness (Denzin 1978). Company background information, internal and external documents (press releases, presentation slides, executive speeches and interviews), archival material, detailed interview, and observation protocols were integrated and used in our database. Although, according to Creswell (2002), generalizability and reliability are of less importance for the qualitative researcher, we nonetheless strived to fulfill the highest standards possible in terms of the data quality. Since exploratory studies are not concerned with internal validity, we focused our attention on a concept of analytical generalization by applying multiple sources of evidence, pattern matching, and by addressing potential rival explanations (Yin 2003). Reliability was sought afterwards by strictly following academic transcription and documentation standards when preparing the interview and analysis protocols, through multiple iterations of our analysis, and by cross-analyzing our comparative findings (Creswell/Miller 2000; Lincoln/Gupa 2000). Most importantly, key informants and interviewees reviewed the case study protocol and report, and cross-checked the results of the analysis.

We circumvented the disadvantage of not having taped all interviews by writing detailed reports and analyses of the talk immediately after the conclusion of the interview and by having the interviewees check them where possible. An eventual cross-check of taped and non-taped interviews proved that the quality of both protocols were equally high.

After the data gathering was concluded, we structured and coded the data through cyclic reading (Strauss/Corbin 1990). In accordance with grounded theory research (Glaser/Strauss 1967; Miles/Huberman 1994), we identified where there was a need for action regarding the aging workforce, the perception of the challenge, the operationalization of the main issues, the factors influencing competitiveness, the measures applied, and the strategic orientation of
related projects. We analyzed our database in accordance with Miles/Huberman’s (1994) understanding of how to deal with qualitative data, as well as Strauss/Corbin’s (1994) basic concepts.

As a first step, we proceeded with open coding, generating categories of information, as illustrated in Figure C.1. Altogether, the study resulted in 142 categories that provided a comprehensive overview of all related issues and topics in the field. During axial coding, we then grouped the categories into a smaller number of sets, identifying a dominating constituting element (competitiveness, as well as secondary and residual elements) through selective coding.

![Figure C.1: A Schematic Overview of the Conducted Coding Process.](image)

Although these analytical steps, which are typical of grounded theory, do not require an exhaustive explanation, Figure C.2 illustrates how the authors moved from open coding to axial coding in respect of the competitiveness element:
Productivity, efficiency and costs are three codes that were constantly repeated during the interviews. They were directly related to a not further defined concept of competitiveness within the specific automobile company’s realm. During the analysis, it became apparent that those codes could be subcategorized into the general term competitiveness and that the interviewees’ more detailed elaborations on being competitive always related to one or more of these three codes. Therefore, this element also served as an “anchor” to which other categories could be related, as will be described in detail in the following sections. The process was analogous to that of the other codes until they all fitted into a superior category. It has to be emphasized that the identified dominating element competitiveness only serves as a means to link the other elements to one another and to clarify potential interrelationships. This is a result of the analysis process and not a scope of research that the authors chose voluntarily. This linking is analogous to combining cluster-analytic and factor-analytic methods that are found in more quantitative approaches (Miles/Huberman 1994) with axial coding (Creswell 2002; Strauss/Corbin 1994). It is especially important that this point is
highlighted here, since our competitiveness construct is only valid in terms of its defined context. The authors do not know of any exhaustive and general definitions of the term, especially with regard to aging workforce management; consequently, this represents another important research gap beyond the scope of this contribution.

In summary, we used network schemes and matrix displays for axial and selective coding in order to illustrate hierarchies and relations, as well as dependencies between the coded categories. Once again, we adhered closely to the recommendations made by Miles/Huberman (1994). Figure C.1 illustrates how we applied the coding process in practice, moving from interview data to constituting elements, and then to the subsequent interpretation of our findings. Our results are the outcome of a qualitative and explorative study based on a grounded theory paradigm and analytical methods. Our research strategy ranged from participant observation and semi-structured interviews to the analytical use of print material and background information about the organization.

C.4. RESULTS AND INTERPRETATION

In this section, we illustrate the constituting elements identified during our coding process in detail and interpret these findings in the context of our research. We consequently aim to answer the questions: What defines the aging workforce challenge in our research sample? What are the issues with which aging workforce management has to cope?

As explained above, Figure C.1 displays some of the open codes that we gained directly from a cyclic reading of the archival data and interview protocols. After grouping these codes into appropriate categories, we applied triangulation to identify the major driving element, which is ‘competitiveness’ (see Figure C.2). It is important to note that this element has not been intentionally placed in the focus of the following results and interpretations, but that our
analysis has led to its identification as a main element to which other elements relate – as indicated in the interviews. The prominent position of competitiveness in our theoretical construct is therefore a result of applied grounded theory analytical steps and by no means a scope of observation or of our research.

Our study reveals that a number of measures are applied to produce competitiveness but that these measures might be counteracted by aging workforce symptoms, such as absenteeism. The conflict between measures that try to achieve competitiveness, on the one hand, and issues arising from an older workforce, on the other, is what defines the aging workforce challenge.

Measures applied to address the aging workforce challenge are, however, undermined by what can be categorized as the ‘human factor’. As our interviewees indicate, appropriate leadership might solve this conundrum. This interrelation of applied measures, ‘human factors’, and leadership are the residual constituting elements of aging workforce management as identified it in our research. In the following, we will elucidate the details of these elements and their interrelations.

C.4.1. AGING WORKFORCE CHALLENGE DEFINED: WHAT ARE ITS CONSTITUTING ELEMENTS?

Our research indicates six discrete constituting elements of the concept of aging workforce management, of which one is a major element, two are secondary elements, and three are residual elements. These are indicated in Figure C.1. These six elements are interrelated and dynamically linked, despite their relative importance. They are only differentiated for analytical and discussion purposes.
Competitiveness: The Major Constituting Element

Competitiveness as a concept is not easy to define. Moreover, the authors know of no literature that examines competitiveness within the scope of aging workforce management. This is largely due to the fact that, depending on whether one refers to companies, industries or nations as a whole, the term receives its meaning from the context. Comparatively, competitiveness usually refers to participants’ ability and performance in a specific market (Krugman 1995). It can therefore be argued that competitiveness is a concept that has to be defined according to the respective business.

In our context, competitiveness means competing successfully in the market in the present and future in terms of productivity, efficiency, and costs despite an aging workforce. In every interview, we found an indication that the actual fear regarding the workforce’s higher average age is not age itself, nor is it of possibly having to acquire additional measures (training or ergonomic devices). Currently, the single most important issue for any manager in the automobile industry is the increasing global competition and the resultant pressure for higher productivity, efficiency, and lower costs, especially with regard to financial data and key figures. This business is facing an increasingly competitive market, with more competition arising in Asia. The product itself is mature and the price is an important factor, especially in the mass product car sector. Producers and even plants of the same conglomerate are competing against each other in terms of productivity to ensure low production costs. The cost of labor has specifically become an important issue for the European automobile industry. While, for example, Asian producers’ quality standards are increasing, they still produce at lower costs. These factors are causing increased pressure, not only between companies, but also within the same company as it could determine where the next generation models will be produced.

As mentioned before, certain issues linked to the aging workforce, especially in Germany, are
thought to affect the key indicators of organizational success via increased cost, thus endangering the organization’s competitiveness. We will examine this in more depth, while elucidating the other elements in the next sections.

**Measures Aspiring Competitiveness: Secondary Constituting Element # 1**

Facing the pressure of increased costs and the overall quest for more competitiveness in terms of productivity and efficiency, the management in our sample is employing certain measures to achieve this goal. The most important measure established via the interviews was the increasing standardization of work and processes. This means that the automobile industry in our sample is currently setting more rigorous standards for task performance, especially for those on the production line. Jobs are analyzed in terms of their value creation and streamlined according to the core value-creating tasks. Workers are then trained to perform according to a strictly laid out work design. This includes fixed workstations within which assigned tasks have to be performed on the production line, fixed cycle times for each station, and single-step clocked jobs. The idea is to increase quality by performing easier tasks and to make training of the jobs easier.

This is closely linked to the workers’ flexibility. Management requires them to perform different jobs, moving to where they are needed most to create value for the organization. A typical example is the launch of a new product that might require more employees at a specific facility that is facing more demand than at locations with mature products. Flexibility in terms of deployment and more standardized workplaces, with training being facilitated where required, are complementary factors that contribute to the organization’s competitiveness.

Finally, management requires the workforce to increase its overall performance. Although standardization and flexibility already make high demands on employees, they are linked to
other, preconditioning or resulting issues like decreasing cycle times, increased pressure to learn new tasks and less possibility to work at favorite workstations. The average worker has to perform at a much higher level today than his or her counterpart a few years ago. Regardless of continuously improved ergonomic measures, mental and physical stress levels have increased as well. This is confirmed by all of our interviews. While this can contribute positively to the workforce’s competitiveness, it is, however, also negatively linked to the factors and issues that possibly conflict with competitiveness. In the following, we will describe this relationship in more detail.

How these competitiveness issues relate to the aging workforce is described below.

**Aging Workforce Symptoms: Secondary Constituting Element # 2**

Our research indicates that there are certain factors, linked to age, that directly influence the cost of production and therefore productivity. First of all, a workforce with a higher average age leads to a higher percentage of constrained workers, i.e. workers who are no longer able to perform their tasks according to the company’s standards. In the automobile industry, this usually means that an increasing number of people, who work in shifts on the production line and perform various degrees of strenuous physical duties, are no longer capable of doing their job or any other value-creating responsibility. In Germany, for example, these workers cannot be laid off, so it is common practice to continue to employ them in easier workstations, like supplies, or in other jobs that are not part of the core business. Since they still receive full pay, these measures create a significant burden in terms of the organizational cost structure.

Another factor is the increase in the number of days absent. There is a well-known and very well researched correlation between age and the number of days workers are absent due to illness. Our research confirms that older employees are not ill more often than younger ones, but when they are, they are absent for much longer.
While these two factors are actually the only ones that can be confirmed through measurements and figures, there is another factor that cannot be proven so easily – individual workers’ commitment to the job and the company. This factor’s affect might, however, impact the overall cost structure to the same degree as the other age-related factors. While smaller, handcrafting companies offer excellent examples of employee commitment, no matter what the ergonomic conditions are, the opposite is true of mass manufacturing companies. There, interviewees across hierarchical levels indicated that there is a lack of employee commitment, which not only affects the number of days absent, but also willingness to be classified as a constrained worker:

If, regardless of the reasons, there is no commitment, the slightest physical disorder is a good enough reason to be absent from work, which is fully paid for a certain number of days. Moreover, workers do not mind being classified as constrained and accepting an easier job. This perception is based on our interviewees’ years of personal experience with these matters. They do, however, also know workers who are indeed committed and, despite their more advanced age, are never absent and do not at all require an easier job.

These factors influence competitiveness directly and interfere with measures aspiring to increase competitiveness. Our research also indicates that the described managerial measures can actually worsen the situation. Standardization, increased demands regarding the workforce’s flexibility and improvement in their overall performance are all aimed at the average healthy and fully capable worker. Limitations in terms of health, commitment, or age are not generally taken into account, making it even more difficult to employ an older workforce and discouraging them even more. Therefore, there is a contradictory relationship between managerial measures and efforts to achieve competitiveness and the factors and issues linked to age that could conflict with this goal, resulting in a vicious circle.

Figure C.3 illustrates the major constituting element and the two secondary constituting
elements that define the aging workforce challenge as described above, with their respective variables.

**Figure C.3: Major and Secondary Elements Constituting the Aging Workforce Challenge.**

**C.4.2. AGING WORKFORCE MANAGEMENT: THE RESIDUAL ELEMENTS**

Up to this point, we have described what is considered to be the aging workforce challenge as perceived by the interviewees in our sample. We subsequently discuss the three residual constituting elements of aging workforce management: measures addressing the aging workforce management challenge; the human factor; and leadership.

**Measures Addressing the Aging Workforce Challenge**

In order to deal with the aging workforce, management has begun to implement certain measures. Most common is the adaptation of well-known, existing tools, especially in the field of health management and human resources. These tools range from information and communication about health to more concrete issues like the introduction of health and fitness clubs at plants, regular flu shots, and general examinations, to mainly ergonomic measures on the production lines. Adapted recruiting, if possible, career development, as well
as succession planning are more examples.

Another measure is the matching of workstations and employees. This is a process in which all available workstations, for example, on a plant’s production lines, are analyzed and categorized according to the specific physical exertion and training that they require. The available workforce is then analyzed in respect to their physical and training status. Ideally, job requirements and individual abilities are matched and a suitable worker, who can perform within the set standards, is assigned to a compatible position on the production line. Apart from the many issues that this approach raises, such as concerns about data security (mentioned the union committee), it is not a new measure. It might, moreover, not even prove to be helpful if the available workforce is no longer quantitatively sufficient to meet the workstation requirements due to an increase in constrained workers and there are cost restrictions on hiring. In theory, however, this could be a chance to assign even constrained workers to value-creating positions.

Another possibility is, of course, to simply release the redundant older workforce and hire new people to fill the vacancies. In many interviews, it was mentioned that due to increased productivity and/or decreased demand for certain products, a general personnel surplus has been building up. Retiring that part of the workforce that is already considered constrained would, according to the interviewees, not only reduce overcapacity costs, but would also decrease problems with constrained workers. Our research shows that within our interviewee sample, this is definitely considered a valid tool by management for dealing with the demographic challenge, and possible negative side effects, like age discrimination, legal issues or the loss of valuable knowledge and experience, are usually entirely ignored. Finally, management also tries to appeal to the workforce’s self-responsibly as far as their health, commitment to the job and organization, and keeping their capabilities up to date is concerned.
The Human Factor

We next examine the subtler and subconscious areas of the soft factors related to the aging workforce. According to our interview sample, they, too, can negatively influence the successful implementation of measures to increase the aging workforce’s productivity.

Most significant of these soft factors is the short-term thinking of many responsible managers. Most interviewees emphasized that cost pressures meant that the applied measures’ long-term perspective, success, and sustainability were neglected. Managers are eager to perform well in terms of short-term key financial figures and try to avoid costs and investments that will not pay off in the short run. However, investments in human resources are usually long range, costly, risky, and might not pay off for years. Most corrective measures are short-term, simple, and non-risky tools that are easy to check off on the managerial agenda before returning to the day-to-day business.

In our interviews, we were confronted with managers and the workforce’s individual interests. While management is interested in short-term success, the workforce strives to improve their work situation. They furthermore regard self-responsibility in respect of their health and commitment a private matter. Moreover, trying to avoid tougher work conditions is common, regardless of age. Other human factors include motivation in general and employees’ mindset, especially regarding commitment. As some interviewees pointed out, the increased need for competitiveness is contrary to what the workforce has been accustomed to, especially in western industrialized countries with an incumbent automobile industry. When the older workers were hired, work design was more oriented towards the philosophy of teamwork and job enrichment. Standardization follows an opposite paradigm. Lay offs and early retirement have also effected the overall motivation to perform beyond the basic requirements and have created a self-focused mindset in younger workers as well.

It is, however, important to once again point out that all these issues resulted from the
research within our sample. The human factors mentioned above are specifically still a conundrum and contribute greatly to the underlying insecurity associated with them in the automobile industry. These factors should in fact make management aware that the challenge of aging workforce management cannot be mastered by simply adjusting the already existing toolbox with its focus on the obvious.

**Leadership**

When analyzing aging workforce management at this level, the most important question is: what can responsible and sustainable management do to correct the possible negative influence of human factors and to allow suitable measures to be successfully implemented?

As mentioned before, the human factor is a conundrum. Many interviewees highlighted the importance of appropriate leadership, close to the workforce, to understand their issues and to find appropriate measures that are mutually beneficial. However, we are not sure whether this is an actual solution or whether it is just the only solution available. The most significant issues regarding the human factors mentioned during the interviews were appreciation, care, and self-responsibility. Consequently, leadership should appreciate the workers’ needs, concerns and problems, while simultaneously keeping the organizational goals in mind. The leadership therefore has to steer a course between creating the necessary motivation and commitment, and stimulating awareness of self-responsibility.

Leadership can influence the impact of human factors on managerial measures aimed at the aging workforce. However, we also found that managerial measures can also have a negative influence if they ignore the human factor.

From the description of our research findings above, it is clear that the identified categories are to a certain extent sequential: After the identification of the aging workforce challenge, certain measures try to address the related issues while potentially being counteracted by
human factors, which appropriate leadership is supposed to mitigate.

In the next section, we provide recommendations of how the actual interrelations between these factors should be researched in future.

C.5. IMPLICATION FOR FURTHER RESEARCH

The research presented in this paper was aimed at identifying the constituting elements of aging workforce management to construct an essential understanding of the concept in the automobile industry. As the demographic impact on organizations, especially in industries where physical labor is predominant, is still underrepresented in academic research, we applied grounded theory, which is very suitable for this kind of research setting. Based on participant observations, as well as archival data and interviews, and after a process of coding, we identified constituting elements that answer the question of what the aging workforce challenge is and what other important issues are that management has to face.

The results suggest that the automobile industry’s actual focus with regard to this topic is on its overall competitiveness in the global market and that preliminary measures are aimed at improving competitiveness. However, as described, the aging workforce might be a barrier to this goal. Therefore, in our research context, this challenge could be defined as organizations’ on-going quest for competitiveness in a global business environment despite the possible negative impact of an older workforce.

Although, aging workforce management is primarily aimed at correcting the most obvious effects, especially on a physical dimension, our research does prove that this is not enough to understand and successfully manage the problem in organizations. Underneath the most obvious issues, there are human factors that do not necessarily have anything to do with age and that will make it very difficult to fully understand how organizations can be sustainably managed and provide benefits for all stakeholders under these circumstances. As described, our interviewees recommended appropriate leadership to correct human factors.
Furthermore, the actual challenge and the essential constituting elements consist of issues that are common to any organization’s management agenda. It is therefore a misconception that the aging workforce provides management with a totally new problem, and that, subsequently, a totally new organizational toolset is required. The residual elements are also very familiar to any organization facing similar problems. Our contribution with this work is thus aimed at a clearer understanding of the actual challenge – thanks to an exploratory first definition in the field – and possible suggestion where future research needs to be applied.

Our research approach and methodology had both advantages and limitations. As already emphasized in the methodology section, grounded theory is very appropriate when it comes to research topics that still require much basic work. Our research follows seminal works on how to apply grounded theory, and draws valuable data from a number of sources. We do, however, also face one major limitation in that, as we pointed out, the aging workforce affects organizations individually and they thus require individual solutions. The results presented here may be valid for the companies constituting our sample, but they are certainly not generalizable across organizations.

In order to overcome this limitation, it is our intention to provide these results for further studies that extend to other industries. Future research will have to address important questions with regard to cause and effect, interactions between elements, and measures to actually change mindsets and apply appropriate leadership. Specific research questions should address the link between a workforces’ actual age, organizational performance and its operationalization, as well as addressing how human factors influence the implementation of related measures. Moreover, the respect in which aging workforce management differs from any other management process needs to be clarified, as well as, most importantly, the kind of leadership that is required in practice. In general, the interrelationships as well as the effects between the identified constituting elements have to be analyzed in further detail.
Figure C.4 provides a conceptual framework that the authors would like to propose as a guideline for further research efforts, as it graphically summarizes the above statements and propositions. In this figure, we present the aging workforce challenge “on top” as it was described in detail in the previous sections. Below, the reader finds the residual elements in progressive order, with the arrows indicating potential interdependencies, for example, the potential effect of appropriate leadership on the human factor, as was described above. Our interviews provided some evidence that starting with the actual challenge, the residual elements are interrelated to one another in the presented, interdependent way. Since the scope of our own research was not sufficient to cover these issues, the authors of this article would strongly recommend further research efforts on the potential and hypothetical interrelationships of residual elements.

Figure C.4: A Conceptual Framework of the Interrelated Elements Apparent in the Management of the Aging Workforce in the Automobile Industry.
C.6. REFERENCES


PART III

ANALYZING THE EFFECTIVENESS OF CONTEMPORARY AGING WORKFORCE MANAGEMENT – THE CASE OF DAIMLERCHRYSLER

- Resubmit -

Authors:

Christoph K. Streb

Sven Voelpel
The case study presented in this paper analyzes the effectiveness of a set of five practical health and human resource measures found at the DaimlerChrysler automobile plant in Bremen, which are commonly intended to counteract the potential challenges resulting from the increasing average age of the employed workforce.

Our findings suggest that although the analyzed measures successfully deal with some of the symptoms of an aging workforce, they will not be sufficient in the long-term. This article thus questions the conventional managerial opinion that it is sufficient to address issues related to the aging workforce with a traditional, already existing, toolset. This article makes a strong plea for related long-term investments in human resources and appropriate, innovative measures.

Keywords: Aging Workforce Management; Case Study; DaimlerChrysler

D.1. INTRODUCTION

The increase in the average age of many developed countries’ inhabitants, which has been evident for many decades, is regarded as a demographic change that will affect societies and organizations alike in the near future.¹ In industrialized countries with highly developed welfare and pension fund systems, stagnating or shrinking fertility rates and a simultaneously growing proportion of citizens approaching retirement age are a potential threat to the sustainability of these provisions.²

Business organizations are facing similar challenges. The demographic change in society is mirrored in the demographic composition of the available labor force. Companies located in
countries undergoing such a development have experienced an increase in the average age of
their employed workforce and the labor pool.³ The workforce in many incumbent
organizations in Europe and the US is already in the forties.⁴ A large group of people – the
post-Second World War “baby-boom generation” – is rapidly moving towards retirement age.
In Germany, for example, the aged organization is nurtured by many companies refraining
from hiring new people due to improved production methods and by the legal arrangement
that allows companies to offer workers a governmental subsidized early retirement expiring
at the end of 2009.

The actual effect of the rising average age on organizations is a diverse issue: High-tech
businesses are concerned with how a growing number of older employees will affect their
innovativeness, while companies relying on strenuous physical work are worried about their
workers’ health and physical performance. In both cases, the organizations are also concerned
with the potential loss of important knowledge when large cohorts of employees retire as

A similar discussion is taken up by academic research: Although, for example, physical job
performance does decrease significantly with age, various studies have proved that there is no
significant decline in older employees’ mental skills – provided that appropriate training is
given.⁵ On the whole, there seems to be consensus that older people’s learning ability equals
that of younger ones even though they require more time to do so.⁶ The general deterioration
of physical capabilities with age, however, cannot be questioned in the real business world.
Empirical findings at the DaimlerChrysler plant in Bremen confirm that older workers do
accumulate more sick days and are more likely to become physically constrained, i.e. many
older workers are no longer capable of doing a broad spectrum of jobs. Since they remain on
the payroll while others have to be employed to take over their tasks, there is a significant
increase in the related personnel costs.
In this article, we focus our attention on the DaimlerChrysler plant in Bremen, which adopted a strong focus on the physical dimension of aging and, therefore, on related health issues. Though the potential loss of knowledge and innovativeness is not ignored, the Bremen plant is a production facility with the majority of its workforce employed on the production lines. Consequently, the company’s main concern regarding their aging workforce is the question of how older workers will cope with the physical tasks required of them and the potential impact on physical health. This is regardless of the significant improvement of its workstations’ ergonomic quality in recent years.

Based on the organization’s holistic, strategic approach to personnel development, the Bremen plant identified five health and human resource measures with which to manage the aging workforce, specifically taking issues like health, absenteeism, and the increasing number of constrained workers into account. First, the “Kraftwerk Mobil” is a preventive tool that trains back muscles on the production line. Second, the “Fit-Shop” is a multidimensional, preventive and therapeutic fitness program presented on the plant’s premises. Third, “Rotation” refers to the rotation of jobs on the production line throughout the workday; at the Bremen branch this plays an important role in integrating constrained workers. Fourth, “Ergonomics”, is concerned with the analysis and improvement of workplaces according to varying human needs, such as those required by an increased average age. Finally, “Demographically Oriented Relocation” is a specific, age-related process of relocating people within the plant. The issues these tools address are quite representative of the aging workforce approaches found in the automobile industry as a whole.

It is the goal of this paper to present the results of a qualitative empirical case study evaluating the effectiveness of these measures. Our research question can be specified as follows: How effective are the five health and human resource measures with regard to their impact on the age-related challenges, such as health, absenteeism or the integration of a
constrained workforce and how does this improve the situation in the long-term with regard to the demographic change of society mirrored in the aging of the workforce? Hence, in the context of this study, a measure or tool is to be considered effective in addressing these age related challenges and the overall threat of an aging workforce, when we can clearly identify a positive influence on both short-term and long-term issues. This includes, for example, a significant decrease in age-related health issues and the resulting absenteeism or recurring success in reintegrating constrained workers into the usual production process. The scope of this effectiveness clearly varies in respect of each tool and is thus not limited by a strict definition. Since we knew that in practically all cases hard data would not be available, and since qualitative interviews are the main source of our data, we considered effectiveness proven if this:

1. is the clearly stated opinion of all the interviewees questioned about that specific tool and
2. the perceived effectiveness is not challenged by developments such as the further aging of the workforce.

In terms of the initial scope and area of appliance of each tool, we also regarded whether the tool or measure had initially been designed to manage the aging workforce or not, as another way of gaining some indication about the status of the overall aging workforce management.

Consequently, we first provide an overview of the status quo regarding aging workforce management at the DaimlerChrysler plant in Bremen. Following this, we present a synopsis of our research methodology to provide the reader with the background to our results. Third, we introduce the five health and human resource tools in detail and present our findings with regard to their effectiveness. Finally, we discuss these results and deduce important implications for contemporary aging workforce management and for the further development of related measures that go beyond the current approaches.
D.2. THE DAIMLERCHRYSLER PLANT IN BREMEN

In terms of the workforce, the plant reached its peak around 2000 with about 16000 employees with an average age of 38.6. A significant increase in production capacity during the 1980s led to the hiring of a large number of young employees within the same age range – between 20 and 25 years old. Figure D.1 indicates that this resulted in the overall workforce exhibiting a rather homogenous age distribution. The share of employees between 35 and 45 is disproportionally high. Although the production capacity of the Bremen plant is increasing continuously, the hiring of new employees has significantly decreased since 1993. International competition and advancements in productivity require and enable the plant to produce more cars with fewer people. This combination of restrictive hiring and the workforce’s homogenous age distribution is causing the average age of the workforce to increase, which is bound to reach record heights as workers that fall within the baby boomer range move towards retirement (see Figure D.1).

Figure D.1: Schematic Age Distribution of the DaimlerChrysler Plant in Bremen.

In 2007, the average age of the workforce was approximately 44 years. Under stable
conditions, this average age is expected to increase to 47.5 in 2010. Ceteris paribus, the preliminary data of Figure D.1 projects that in ten years from now the average age of the workforce in Bremen could be well beyond 52. Although this is just an approximate, non-generalizable prognosis, it is clear that if fewer employees are required, new appointments are almost completely suspended, and the legal agreements according to which government-subsidized partial retirement is possible are set to expire at the end of 2009, the plant will face a growing number of significantly older employees for the first time in its history.

As a car producing facility, the Bremen plant is primarily interested in the possible effects that a higher age average could have on its workforce’s physical performance on the production lines. In the plant’s practical organizational context, this performance is usually defined by key figures such as the workers’ health status, the number of work-related injuries – like back problems – and the proportion of workers with health-related problems affecting and constraining their employability. How a higher average age affects other issues, like innovativeness, is neglected as this has very little influence on worker performance on production lines.

Facing the dual challenge of increasing competitiveness and the potential limitation of the workforce’s competitive performance, the plant management is driven to increase its specific efforts to maintain its available workforce’s capabilities and to employ them in a value-creating way. A number of measures, which are presumed to meet the demographic requirements, are applied to counteract the potential downsides of an aging workforce. Consequently, these measures are introduced in this paper and their effectiveness in the organizational context analyzed.

**D.3. RESEARCH METHODOLOGY**

Before undertaking our study of the effectiveness of the measures with which the aging
workforce at the DaimlerChrysler plant in Bremen is managed, it was clear that as a topic, the demographically changing workforce is generally a sensitive one in the automobile industry. It touches on controversial human resource management objectives in times of industry cost saving and personnel backlogs. Furthermore, demographic change is still relatively new on most organizations’ managerial agendas, although it has been acknowledged in managerial research for decades.\textsuperscript{7}

In order to acknowledge the complex and managerial research environment in an automobile plant, we decided on a qualitative case study approach according to Yin (2003).\textsuperscript{8} A case study research is usually appropriate for theory building and testing in real world settings because it uncovers the underlying relationships between determinant factors.\textsuperscript{9} In our particular research setting, it also suited the research object and the research question, since we would obtain our data directly from organizational practice and aging workforce management is a barely researched topic yet.\textsuperscript{10}

We chose to rely on three different sources of data: First, we sifted and organized all available archival data – reports, PowerPoint presentations, and internal publications – to obtain an overview of the aging workforce management efforts at the Bremen plant from its first initiation until the start of the study. These data provided a rough overview of the strategic and operative measures, as well as information on the relevant persons. We next conducted participant observation for more practical insights into the organizational background and into the demographic change in the organization.\textsuperscript{11} The potential to identify meanings and perspectives, while at the same time maintaining a professional distance to the object under observation, is one of the major advantages and benefits of this method.\textsuperscript{12} To allow the phenomenon to be studied in its actual organizational context, one of the authors of this paper became an official member of the organization and with a clear focus on passive observation.\textsuperscript{13} This included working as a blue-collar worker on the production lines for a
time and gradually moving up the hierarchy levels within the organization during his research.\textsuperscript{14} He took part in and observed lean-production projects, the introduction of new assembly line procedures (maintaining the focus on the workforce’s demographic change), and eventually participated in a project management team, controlling the application of aging workforce measures across plant and headquarter levels.

The insights gained from the first two sources of data led us directly to the third source: interviews. The archival data and participant observation clearly indicated five health and human resource measures considered part of the aging workforce management at the DaimlerChrysler plant in Bremen, which thus formed the basis for developing a semi-structured interview guideline. We subsequently determined a list of people whom we wanted to interview in respect of each of the tools. Basically, the interviewees would range from the implementing management – responsible for introducing the tool to the organization – to the shop floor management and, finally, to the relevant workforce members. Although we applied a semi-structured interview guideline, the open ended questions asked were slightly adapted with regard to the specific tool and the interviewee’s background.\textsuperscript{15} We would aim for a detailed description of the implementation process of the measures, the involved people and departments, the intention of them, and, of course, for insights of the potential effect with respect to symptoms of an aging workforce.

A total of 31 interviews were conducted across all hierarchical levels at the Bremen plant. The data obtained were supplemented by archival data. The interviews were audio taped and transcribed for subsequent analysis to ensure validity.\textsuperscript{16} We furthermore applied a process of cyclic reading and, in keeping with Miles and Huberman (1994), a matrix display of literal and exemplary responses.\textsuperscript{17}
D.4. ANALYSIS OF THE EFFECTIVENESS OF THE AGING WORKFORCE MEASURES IN THE DAIMLERCHRYSLER PLANT IN BREMEN

In the following sections, an introduction is provided to the five health and human resource management tools that are currently applied and implemented at the DaimlerChrysler plant in Bremen in the context of aging workforce management. This is followed by an analysis of the specific tool illustrated with relevant quotes from our interviews, which shed light on the measure’s perceived effectiveness, i.e. their potential positive influence on aging workforce related challenges such as health, absenteeism or the integration of a constrained workforce.

D.4.1. BACKGROUND OF “KRAFTWERK MOBIL”

The “Kraftwerk Mobil” as it is implemented at the DaimlerChrysler plant in Bremen is a mobile training unit to improve abdominal and back muscles’ suppleness and strength. These are considered a crucial factor in the prevention of muscle and skeletal injuries, as well as back problems. According to our archival data, at the Bremen plant such injuries and problems account for one third of all blue-collar workers’ health-related issues. The unit itself resembles the machines with which to exercise abdominal and back muscle found in many gymnasiums: A person sits on the machine, fastens a clamp over his or her shoulder, while keeping the legs at a 90 degree angle. Moving only the upper body forward and backwards, the participant can either apply tractive forces of the abdominal muscles or, after a quick adjustment of the unit, push with the back muscles. It differs from a training unit in a gym, in that this unit is under the fulltime supervision of a trainer who, according to a schedule, physically moves it to the shop floor and the production lines.

After setting up the machine at a fixed location and at a fixed time during a shift, the trainer assists the assigned workers with their workout. Prior to a worker’s first training, a computer analysis is conducted that analyzes the agility and strength of his or her abdominal
and back muscles and their balance. If deficits are found, the trainer will compile an individualized program, specifying the necessary repetitions and weight required to improve and equalize the muscle performance. Subsequently, a participant has a ten-minute training session once a week, building up strength and agility over a 14-week period. The program is thereafter adjusted to maintain the achieved improvement over another 26-week period. During this time, the participant and the trainer continuously monitor the progress, again relying on a computer analysis. During their ten-minute workout, colleagues replace these workers to keep the production process going.

Besides the training, the participants also receive information on a healthy lifestyle and suggestions regarding other activities that might improve their physical well-being. Workers with already diagnosed health problems, who want to participate, might require a medical check-up from the company doctor before being allowed to participate in the training sessions.

D.4.2. ANALYSIS OF “KRAFTWERK MOBIL”

From our interviews, we gained the impression that “Kraftwerk Mobil” is a very successful tool that not only preventively improves workers’ physical performance but also contributes significantly to the shop floor’s motivation and work climate. The interviewees’ personal experiences of this tool were all positive. The major advantage of this measure is obviously that its threshold is low due to the training unit being brought directly to the workers on the production lines during working hours. This is not only convenient in terms of accessibility, but it also allows people unfamiliar with such training methods to gain a first impression of what actually happens during such a workout. Consequently, even those employees who would never consider participating in such an activity or who are simply not sufficiently motivated, for example to visit a regular gym, are directly addressed.
A health management coordinator from the plant on the advantages of the “Kraftwerk Mobil”:

“This is not only an acknowledgement that they [the workers] have a difficult workstation, but also that they can do something to prevent related illnesses right on the spot. The advantage is also that those people can be accessed that would usually not participate in such measures. Additionally, our trainers are also production line workers; they therefore have a high acceptance rate [among the blue-collar workers].”

As far as the workforce’s acceptance and participation is concerned, it seems an important issue that the trainers are actually blue-collar workers with additional qualifications as sport coaches and training supervisors. One trainer comments:

“Some workers who do not know us [the trainers] approached us saying: ‘You have no idea what it is like on the production line!’ I can tell those people that I have worked on the production lines since 1989. They then understand that we know what kind of physical stress they experience. On the other hand, some say: ‘You come from the production lines, so you do not have the skills to coach us!’ However, we can combine our gym experience with our work experience in the automobile production. An external person, even a physiotherapist (...) might have no idea of how the physical strain accumulates over the years.”

Although the general subjective evaluation of this tool was very positive and the interviewees found it difficult to identify any improvements, the major challenge is that it is very difficult in a real world organizational setting to determine the cost-benefit ratio. While the costs of the machinery, the computer software, the trainers, and even the substituting worker can be calculated easily and accurately, the effect of this measure on issues such as health, motivation, personal responsibility for health, and, especially, improving an aging workforce’s work situation is hard to quantify. Currently, the subjective feedback from
participants is utilized to assess the success of the “Kraftwerk Mobil” at the plant. In this regard the health management coordinator mentions:

“Those people who have never taken part in sport before experience an obvious increase in muscle strength. (...) Those people who go to a gym, for example, experience less improvement. (...) However, we do not have reliable hard data on this. (...) Almost 100% of the participants who suffered backache before report an improvement. All of them say this measure makes sense and many have taken up sporting activities at home after their experience here. (...) Of course, ‘Kraftwerk Mobil’ cannot prevent people from having a hernia if they are already close to having one. (...) We have taken subjective and objective polls on the participants’ satisfaction with and the success of this tool for two years now. But it is impossible to control for other effects because if a particular person did, for example, a lot of gardening at home, his back will be different from somebody who just lies on the couch. (...) So far, we have reason to believe that those people training on the ‘Kraftwerk Mobil’ have fewer problems with their backs than those that don’t.”

One of the trainers comments on the possibility of measuring the effectiveness of the “Kraftwerk Mobil” and the related support of the workers as follows:

“We also provide things that cannot be measured, like giving advice on losing weight (...) or giving up smoking. (...) The company can only monitor the general health status, but not the general well-being. (...) If somebody trains his back muscles and consequently does no longer have back problems, his well-being will improve at work, and at home, and this will contribute to the worker’s general well-being. This cannot be monitored. We receive feedback from the workers that they have fewer or no problems at all (...).”

There were no statistical data available on how successful the “Kraftwerk Mobil” is in terms of improving the health status of an older workforce or of supporting the reintegration of
constrained workers, which would have been helpful to actually assess its effectiveness. We therefore had to totally rely on the qualitative contribution of our interview partners. Despite the lack of hard data and the fact that the “Kraftwerk Mobil” is only a preventive tool that cannot be applied in cases of serious health problems that require specific therapeutic attention, our interviews identified a strong belief in the tool’s potential use. Furthermore, our data indicated that related organizational processes, like assigning participants for training sessions, work well and that this also enjoys top management support. This is verified in that people with back problems receive “Kraftwerk Mobil” training during regular working hours despite the costs related to finding substituting personnel. Top management is therefore assured that improvements in the workers’ health outweigh the costs. Together with other health-related measures, especially ones that are not only preventive but also therapeutic, the “Kraftwerk Mobil” is regarded as an important tool to improve physical health, workability, motivation, and general well-being at the plant.

Apart from this positive feedback, however, we could not identify a specific focus on the aging workforce, since the tool is generally aimed at the conventional back problems of production line workers, regardless of age. Demographic data confirmed that the training participants’ average age is almost similar to that of workers on the shop floor. Although our interviewees confirmed that there is a general correlation between age and back problems, these problems can appear at any age and are not necessarily a reliable symptom of an aging workforce.

Bearing in mind the limitations stated above, this tool can thus be regarded as preventively very successful and effective according to our initial definition at tackling important, health-related issues related to age. Only with these restrictions in mind can it be considered a tool to manage an aging workforce. Therefore, we acknowledge the important impact that this approach might have on the general health and well-being of participants, especially as these
D.4.3. **BACKGROUND OF “FIT-SHOP”**

The interviewees described the “Fit-Shop” as a multimodal and multidisciplinary fitness center that is a licensed physiotherapeutic practice. Although the location looks like a normal gym at first sight, there are important differences. The “Fit-Shop” is located at a central point on the plant premises. It offers a variety of health-related programs and activities, both preventive and therapeutic, which go well beyond the range of what a normal gym offers. The programs are furthermore supervised and guided by skilled personnel from a multidisciplinary background, varying from physiotherapists and sport scientists to psychologists.

Several interviewees confirmed that approximately 40% of all sick leaves were due to postural and musculoskeletal-system-related injuries. They further reported that there is a clear correlation between these injuries and the injured workers’ age. Consequently, in cooperation with an external provider, a health centre to improve the situation both preventatively and therapeutically was situated within the plant end of 2006. As an autarkic unit, the “Fit-Shop” was outsourced as the necessary know-how, skills, and manpower were not available within the plant. The responsible decision-makers – the plant doctors and health management – acknowledged that the plant had potential multidimensional sources of health-related problems that had to be addressed both adequately and multidimensionally.

The “Fit-Shop” thus broadly targets two types of workers: First, those who require or are interested in preventive fitness offerings, like the muscle and cardio-training units, which are similar to those found in a normal gym. Second, those workers who have problems related to the musculoskeletal system and require therapeutic treatment to regain their physical health.

issues may become more relevant when the average age of the workers increases.
and work capability. The workers can simply join the “Fit-Shop” health club and use only those programs and facilities that they like. If they require therapy, they can join one of two individualized therapeutic programs focusing on musculoskeletal issues and varying in duration and intensity. Joining the “Fit-Shop” is extremely cheap compared to other gyms. The “health and trainings course” that new members have to undertake, is subsidized by the health insurance fund and therapeutic programs are usually also fully covered. A unique advantage of this facility is that prescriptions for therapy issued by the plant doctor or any external physician can be provided here, thus offering the patient with a single point of treatment.

D.4.4. ANALYSIS OF THE “FIT-SHOP”

The “Fit-Shop” appears to be a very appropriate tool for the challenges related to an aging workforce by not only providing preventive treatment (like the “Kraftwerk Mobil”), but actually treating existing problems. According to the head of health management at the plant:

“We do not hire new people; we [the plant] will therefore age collectively and are approaching a problem [i.e. an aging workforce]. This is exactly the reason why we implemented such a measure: Very often management as well as the plant doctor do not have any tool at hand to react to this challenge at the spot. (...) Multimodal therapeutic programs do not exist in the common health insurance system. (...) In difficult cases you have to approach the problem from various perspectives.”

The advantages, as described in our data, are obvious: It is a fully licensed physiotherapeutic practice, with a wide range of preventive and focused training facilities and programs located at the plant. It is cheap and has a low threshold. Moreover, it is autarkic, thus posing no financial risk for the plant while allowing the workers to deal more openly with their health
issues than they probably would have towards their employer. Shop-floor managers can use the “Fit-Shop” actively as a tool to tackle health-related problems in the day-to-day business and to improve their department’s health status. Our data collection did not identify any serious disadvantages related to this tool.

Since the “Fit-Shop” has been open for less than a year at the Bremen plant, hard data on its impact on the employees’ general health status are still lacking. It is therefore still too early to assess its effectiveness quantitatively. However, the individual feedback from the interviews is very positive and most interviewees report improvements of individual health issues. The external operator has set a minimum standard of an 80% success rate of participants returning to their duties promptly compared to the 40% success rate achieved by conventional therapeutic methods. The head of health management has the following to say on the difficulty of judging the success at this point:

“Overall [the various “Fit-Shop” programs] have developed very positively, but at a varying pace. The ‘health club’ [i.e. the “Fit-Shop” used as a gym] is a great success because it is very easy to join. The therapeutic programs have developed slowly and we have to improve them. This is due to the different interfaces not interacting well as yet. This is because management is still not aware of this facility’s capabilities. We are, however, already busy providing more information.”

The problem with judging this tool goes deeper, as the management director of the “Fit-Shop” reports:

“I would say that we could improve [the health and work capability] of those really participating in our program between 90 and 100 percent. Of course, they have to continue doing something. We have to activate them to do that. (...) We do not know what it will look like in a year’s time, but the first success rate is very good. (...) It is not all in our hands,
however. The conditions couldn’t be better, we have the health insurance funds’ support, the facilities to do therapy, the skilled trainers, and the support of the plant, but it all depends whether the people accept it and are motivated to actively participate.”

The issue of motivation is a crucial one, as the branch manager of the DC BKK (health insurance company linked to DaimlerChrysler) confirms:

“It is possible to completely regenerate people [in terms of their work capability]. However, often it is all about incentive systems. One has to be aware of where peoples’ interests lie. The individual worker might benefit from being ill. (…) Because of the ‘system’ [e.g. guaranteed income] many might be quite happy with an easier workplace.”

These quotes, as well as comments from head of health management, confirm the potential of this particular tool, while at the same time highlighting one of the greatest challenges for any measure introduced to improve the workforce’s health: The individual workers’ self-responsibility for their own health and their motivation to improve it. According to many of our interviewees, it is not uncommon and quite logical for some workers with health problems constraining them in their deployment to wish to be transferred to relatively ‘easier’ workstations. These workers will continue to receive the same wage, regardless of the value that a specific job adds. Since not every constraint is a serious illness, and would not affect the relevant persons in any other way, recovering their health would under such circumstances require losing an easier workplace. It is a major challenge for such tools to succeed in ensuring people that being healthy is in their best interest. According to a member of the shop council:

“Just because we have a ‘Fit-Shop’ and ‘Kraftwerk Mobil’ this does not mean that the health status will improve. (…) Production line work without any leeway has a serious stress factor. This has to be compensated. [If nothing else] this will result in psychosomatic issues.
There will be stomachaches and back aches, etc. (...) One cannot tackle this. (...) What we need is an alternative [organizational] culture [than the current, for example, cost-based one]. Top foremen, for example, have less absenteeism. (...) People need a foreman on whom they can rely.”

This could also explain his observation that in one particular production hall sick leave levels stayed the same, although similar health measures led to an 11.8 percent decrease in musculoskeletal issues. An executive at the DC BKK provides other reasons that could explain this phenomenon:

“We had a survey in which we compared people training their back muscles with those not exercising. The first year it developed as we expected: Those exercising were ill less often; those not doing anything were ill more often. This year it is vice versa! Those doing exercises became worse. (...) This can only be [due to the introduction of the] new management system and ERA [a new incentive and remuneration system].”

These observations confirm that in the broadest sense health is indeed a multidimensional concept. This perception is mirrored in the “Fit-Shop” focus on tackling the most common health problems at the plant with a multidimensional approach. Obviously, health status cannot be explained and influenced by the right organizational health measures alone, organizational culture, well-being, and motivation are equally important factors. This is also supported by the increase in psychosomatic health issues in recent years, which many of our interviewees emphasized.

Despite not originally designed for managing an aging workforce, all our interview partners generally believed the “Fit-Shop” to be an important and potentially very successfully tool. They were certain that in combination with the “Kraftwerk Mobil” this was an approach that could tackle one of the most important problems faced by an aging workforce: health and the
related costs. However, all the interviewees emphasized that this measure still had to prove itself. They also felt that the outsourcing of such tools not only provides advantages but also some challenges. The “Fit-Shop” employees still have to learn about the organizational particularities and earn the employees’ trust. They are already doing well by actually accompanying workers to their workstations and prescribing individual therapeutic measures right where the problem starts. Currently, combining therapeutic treatment with individualized work assessment is a unique approach.

“We are still in the midst of setting up the organizational process. Our initial expectation was that it would be easy to reach those people that come here for therapy. This was how it was organized through the processes, especially by the DaimlerChrysler health insurance fund (BKK). Since we haven’t lived up to our expectations, we have to find other ways as well. (...) I am convinced that there is a great potential for people here, because we see [potential patients] every day at physiotherapy, we see them when we inspect the workplaces, we hear about them from job floor managers...”

says the management director of the “Fit-Shop”. This perception is confirmed by a colleague of his, a physiotherapist at the “Fit-Shop”, who underlines the mutual learning process taking place when accompanying patients to their workstations.

According to our interviewees, the “Fit-Shop” can be regarded as effective. Similar to the “Kraftwerk Mobil”, however, we have to emphasize that this tool can only address the symptoms of the aging workforce (e.g. health issues, absenteeism, deployment constraints, etc.), and does not offer a long-term aging workforce management perspective, for example, on how to actually address the source of such issues which is the rising average age of the employed workforce.
D.4.5. BACKGROUND OF “ROTATION”

Commonly, job rotation is understood as an alternating system that schedules the deployment of employees in an organizational work setting within a defined range of workstations or tasks. While these assignments are usually for a longer term at the white-collar worker level and are less repetitive, within our focus on blue-collar workers, the rotation between workstations occurs several times a day, or even several times per hour.

The intention of job rotation is usually to broaden employees’ perspectives and skill sets, as well as to contribute to job enrichment through variety. As far as blue-collar workers are concerned, the ergonomic aspects are of major importance: By alternating workstations and tasks several times per day or per hour, physical overexertion with all its short-term and long-term effects on health, as well as technical flaws due to repetitive and monotone task can be avoided. In the following discussion, we do not refer to any general definition of job rotation, but to the specific elaboration of the concept “rotation” as found in the Mercedes-Benz Production System (MPS) standards and as implemented at the plant.

The basic assumption is that “rotation” is beneficial with regard to variety, experiences, alternate physical strain, and job flexibility. It has to be economically efficient and the involved workers’ required skills and qualifications have to be guaranteed. Each worker’s individual rotation range is defined after consultation with the work group and the foreman. They, together with the group spokesperson, compile a general group and shift rotation schedule, taking issues such as ergonomic requirements (of the involved workers), quality, and the integration of contractual workers or those with physical constraints into account. At the beginning of each shift, a check is done to ensure that all workers necessary for the rotation are present and can perform their task.

Beyond this basic framework, the core of the “rotation” based on the MPS can be described as following: Each foreman supervises about 36 people (called a “Meisterei”) who are split
into three groups of about 12 people each. Within these groups, the norm is that each worker must be capable of performing all tasks assigned to the group, and have to rotate to each workplace at least once a week. As a further norm, 30% of the group members must be capable of performing all tasks assigned to the “Meisterei.” Another 10% of the group members must be capable of performing tasks that are assigned to “Meistereien” other than their own. Our data indicated an average rotation cycle of between 15 minutes and an hour.

With respect to aging workforce management, rotation is regarded as very important in preventing monotonous physical congestion and might increase in importance – especially with more advanced age cohorts, job enrichment, as well as the reintegration of constrained workers.

D.4.6. ANALYSIS OF “ROTATION”

The “rotation” system was introduced long before the topic of an aging workforce became urgent. As we learned from our data, its current status is the result of a financial and quality-driven development, no longer emphasizing extended work content, but a more focused and standardized workflow. To date this paradigm shift has culminated in the introduction of the MPS and in the further standardization of the work processes. The head of the MPS office at the Bremen plant on about the background to the start of “rotation”:

“We limited ‘rotation’ with regards to MPS to the work group. Before that, it had a broader range. (...) In practice, workers would have had to master a work content of several hours, and they would have had to perform 100% for a defined time. People continuously wanted more and more training [to work on different workstations], due to the correlation with their wages [the more skilled, the higher the wages]. The result was, that they rotated several times a day to different workstations; to some perhaps only once a week if at all, but a the same time they would have to perform at their best and know about adjustments [in the
This situation seriously affected the quality of the work because workers were not familiar enough with the job and were not efficient in terms of wage costs. Beyond this a shop-floor manager at the plant mentioned another reason for the introduction of “rotation”:

“In those days [around 1988] we already aimed at improving the health status of our workforce [with the introduction of ‘rotation’]. And I believe we have been successful.”

The rotation system received very good feedback from the interviewees. There seems to be very little improvement required of the system and that under the current circumstances, the active system is the best solution. As a foreman at the plant concludes:

“During the set-up of the new production lines [for the introduction of a new, more standardized production system] we, together with the plant doctors, were successful in organizing a ‘rotation’ that required very moderate physical strain. Four times a day, workstations were switched during the breaks. Our colleagues could for a while work bent over, then stretched out, once on the left side, once on the right side [of the production line], etc. Now that we have introduced a new model, we will further improve ‘rotation’ to work even better ergonomically. Compared to what I witnessed here during the 1980s, we have taken a huge step forward.”

Despite this general positive feedback on ‘rotation’, there seems to be a trade-off between a short-cycle rotation’s benefits for workers from an ergonomic perspective and the effects of long cycle times, or even very little rotation, on quality, as another shop-floor manager suggests:

“The worker might say that it is great to switch workstations every 15 minutes (…). From an ergonomic perspective, I agree; from a quality perspective, however, this cycle is
too short to achieve an automated workflow that requires similar actions all the time. (...) Unlike Toyota, we do not train our workers extensively in advance...

He thus concluded that errors resulting from the workflow affect the quality of the cars. Other interviewees share his opinion that the optimal “rotation” cycle time depends on the workstation.

It is interesting to note that with respect to the influence on the workforce’s health status the motivation factor was again mentioned. Consequently, the effects of numerous other factors make it impossible to currently assess the success of that measure. This presumption seems to be confirmed by the plant foreman’s bafflement with regard to the high absenteeism rate:

“I don’t know what the reason for it is, maybe it is just frustration. I think a lot happens in their [the workers’] minds. If the work environment is good, then people come here (...) there is a dark figure where frustration is an important factor. (...) There has been a lot of change around here (...), not everybody is as yet familiar with his or her new workstation. Some of the workers have to do the same job for two or three days. That is frustrating.”

“Rotation” is perceived even more critically with regard to the aging workforce. There is clear indication from our data that “rotation” cannot be considered a specific measure for managing the aging workforce. Rather, it is hampered by the growing number of constrained workers who are usually associated with a greater average age. Another foreman remarks:

“I cannot use ‘rotation’ as a tool for an aging workforce, [and problems like] increased utilization and increased job requirements. However, it [‘rotation’] is still a good [everyday] support, no question!”

The shop-floor manager on the same issues:

“The problem is that although I may want to regard ‘rotation’ positively, I cannot
because I do not have the personnel to make it a positive tool. If I have people with constraints, then there are constraints in ‘rotation’ as well. It just seems as if we have done something for the aging workforce. (...) All [other] good approaches have been abandoned.”

The quotes above suggest, that although “rotation” as such is perceived as a suitable tool for avoiding unnecessary physical strain and improving quality, as well as motivation, it is generally not only experienced as ineffective for an aging workforce, but also becomes impracticable. As long as there are still sufficient easier workstations for constrained workers, “rotation” between regular jobs is still possible. However, with an increasing average age, the number of constrained workers will increase as well. Increased utilization and demanding work on the production line already present a challenge for older workers, therefore “rotation” will not only become less effective for them, but might also not be feasible because of them. The head of the MPS office remarks:

“I believe that less rotation is better for an older workforce because it [rotation] means changing all the time (...). Rapidly adapting to and learning new things are better suited to the younger generation. (...) I think older workers would have more problems coping with this.”

A foreman on the same issue:

“I cannot imagine older colleagues being integrated into shorter rotation cycles. The problem is that the utilization is extremely high; the requirements are extremely high, physically and mentally.”

It therefore seems that in order to break this vicious circle, other measure have to be applied as well – an approach that we will examine later in this article. Generally, the interviewees suggest that there should be different “rotation” rates for different workplaces, smaller work groups, and more workstations that are suitable for constrained workers. A shop-floor
manager concludes:

“It boils down to the fact that we have to create workplaces for constrained workers. In order to do this, the company has to invest money. (...) We also have to create the conditions in our workgroups to integrate these people.”

According to the interviewees, “rotation” can be regarded as effective because it reintegrates constrained workers in the production process and helps to avoid physical strain. However, the demographic development regarding the average age of the workforce at the plant is already challenging the application of “rotation”. Thus, we cannot consider “rotation” effective according to our initial definition. One can conclude that despite the success experienced in integrating constrained workers and avoiding monotone physical strain for all workers through “rotation”, it cannot be efficiently used in the long-run to maintain a company’s competitive edge with an aging workforce. The related increase in constrained workers and the simultaneously decrease in suitable workplaces for such workers due to the standardization of work processes will eventually make “rotation” difficult. Consequently, “rotation” can address the symptoms of an aging workforce in the short-run, but it is not suitable as a long-term aging workforce tool and thus cannot be regarded as effective.

D.4.7. BACKGROUND OF “ERGONOMICS”

The International Ergonomics Association (IEA, 2007) defines ergonomics as “… the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.” From a very broad perspective, this corresponds with the perception of the content and tasks of ergonomics at the DaimlerChrysler plant in Bremen. However, in automobile mass
production, this theoretic definition is not enough to fully understand the meaning and processes that happen in the day-to-day business. According to the archival data and the data that we gained from our interviews, ergonomics is generally a set of measures aimed at moderating between the demands of humans within work processes and those of the work processes on humans. These multidimensional and complex goals are mirrored in the variety of (partly contradictory) aims. Ergonomics should therefore be utilized to avoid illnesses, medical symptoms or discomfort by designing human work to that it can be easier done and is more enjoyable. Workers’ skills and potentials should be integrated into their tasks, therefore labor costs should decrease and productivity increase. More specifically, ergonomics is about analyzing, measuring, and evaluating human work and the related strain in order to subsequently deduce appropriate measures to improve disequilibria between human work design and economic efficiency. The basic parameters between which ergonomists can act is strictly defined by a number of physical, economic, and legal boundaries and rules, as well as the specific organizational culture, which we do not intend to address in detail.

During our interviews, we identified three basic steps and tools that are consecutively used at the DaimlerChrysler plant in Bremen. First, there is a guideline for the integration of the constrained workforce. This is based on the matching of a workstation’s (physical) requirement profiles with workers’ specific (physical) capabilities in order to allow all workers – especially those with constraints – to be deployed where they can create the most value. This is done by means of a manual analysis of body posture (in terms of posture type and the time to be spent in each one). Second, the “system for the analysis of body posture” (SAK – System zur Analyse von Körperhaltung) is applied. Although similar to the workstation requirement profile, this system is computer based and allows a scientifically based ergonomic index to be calculated. Finally, the ergonomists in Bremen apply the
“ergonomic workstation evaluation” (EAB – Ergonomische Arbeitsplatz Beurteilung). This too is a computer-based system similar to the SAK, but the result is a visual evaluation of the workstation in green (good), yellow (minor problems), and red (very problematic) categories. This allows the rapid identification of areas and workstations that require immediate attention. Generally, the plant doctor, the job safety office, and the ergonomic production planners work together to deduce the right measure to improve the overall work situation.

D.4.8. ANALYSIS OF “ERGONOMICS”

It is very difficult to answer our initial research question – how effective specific measures address the aging workforce challenges in the organizational setting of DaimlerChrysler Bremen – in respect of ergonomics. More than any other tool described in the course of this article, ergonomics is an extremely mature, common, and multidimensional field that is far from being exclusively focused on the aging workforce. However, by addressing human issues such as facilitating work, motivating people, and decreasing work-related injuries and illnesses, ergonomics does touch on important concerns that are characteristic of the workforce’s increasing average age, such as the growing number of constrained workers.

If just the matching of constrained workers with suitable workstations – where they can still perform value-adding work – is taken into consideration, the feedback is very positive. The head of human resource training in Bremen was involved in the evaluation and subsequent matching processes. She confirms that if these evaluations are done well, an excellent fit can be generated between a task and a worker. To be effective, this has to be done objectively and based on the same standards across the entire plant. She nevertheless mentions that this alone is not a sufficient aging workforce tool, as it is mainly focuses on constrained workers and does not acknowledge other, related issues.
When questioned about the general effectiveness of ergonomic measures, all the interviewees reported satisfactory results. One of our interview partners, for example, confirmed that only 3% of all workstations in the plant are still categorized in the EAB “red” (very problematic) category. This was also confirmed by archival data that indicated continued ergonomic improvement of the working conditions. Overhead work, for example, decreased significantly after the introduction of each new car model. This was mainly due to substantial investments in the ergonomic infrastructure on the shop floor. The interviews revealed that during the introduction of the last new model, 100 million Euros were invested in ergonomics in one production hall alone.

Regardless of the significant topical overlap regarding constrained workers and an aging workforce, as well as many interviewees’ opinion that related efforts should be increased, there seems to be little integration of age-specific concerns into ergonomics to date. The head of ergonomic production line design at the Bremen plant confirms this:

“We did not change our approach [due to the aging workforce] with regard to the planning and consideration of ergonomic design. Our current budget limits our options. We have to realize specific measures with it.”

In our archival data, we, nonetheless, found proof that the potential challenges arising from a demographic change in terms of the available workforce’s average age, had already as early as 1997 led to the guideline for the integration of the constrained workforce. The head of ergonomic production line design nevertheless maintains:

“I don’t think [the aging workforce] will have a great affect and even if it did, we would manage. (…) Everything can be designed so that everyone can do any job. Whether this would be cost effective, is another matter, of course.”

This is an indication of a potential conflict within ergonomic measures: facilitating work
despite increasing labor costs. This would imply that ergonomics as we find it in our particular case organization – and presumably in many others – constantly balances the demands for ergonomic actions as identified by a variety of analytic tools with cost restrictions. The former head of the ergonomic shop floor management in Bremen explains why this is exactly the aging workforce problem that will have to be faced from an ergonomic perspective:

“We have aging workforce and ergonomic measures on the one hand and performance and competition on the other. There has to be a match. If I only care about ergonomics, I cannot make any money. If I only care about the money, this will result in high absenteeism due to illness. The one thing is expensive, but so is the other!”

Although, ergonomics seems to be a well-developed field with little to improve, it is constrained by a number of financial and legal restrictions. Furthermore, new and greater demands in, for example, the production process require a reorientation of the concept, as well as the underlying theoretical measures due to increased cost pressure and standardization. The plant doctor in Bremen requires a modernization and adjustment of the current system that has more or less been in place for the last twelve years:

“We want to implement a tool that covers all plants in the corporation, that is broader, more differentiated and takes account of the new requirements [in the production section]. (...) Due to new assembly technology and changes in the production, body posture is no longer an important topic, but repetitive actions of the finger-hand-arm system are. (...) The combination of body posture, applied strength, and the direction of the applied force will be a challenge. (...) Not much will change in respect of the aging workforce.”

Together with the interviews conducted, the archival data proved that the applied ergonomic measures have been very successful in improving the overall work situation in recent years:
There are fewer “critical workstations” that could stress workers more than necessary and each new model launch initiates an investment in ergonomics. Moreover, people are well aware of the potential challenges with respect to an aging workforce. However, the interviews confirmed that the topic is still not specifically and explicitly addressed. We therefore make a strong plea for an older workforce perspective to be integrated into the analysis and evaluation of current and future workstations, as well as into the implementation of measures. In order to meet the potential increased demand for “easier” workstations, more flexible budgeting is required. Nonetheless, “ergonomics” too does not address the increasing average age and the associated increase in physical problems in the long-term.

Since not all interviewees consider “ergonomics” as effective in addressing the aging workforce challenge, and since budget restrictions limit its potential in the long run, we do not consider “ergonomics” effective according to our initial definition.

D.4.9. BACKGROUND OF “DEMOGRAPHICALLY ORIENTED RELOCATION”

In the automobile business, the personnel required for the production of a specific model is largely dependent on the car’s product life cycle. The introduction of a new model can create a peak of orders. Consequently, plant utilization is very high at the launch of a new product or a model upgrading. At the end of their product life cycle, usually between five and seven years after the launch, models often do not require full production capacity. Since workers cannot just be laid off in keeping with these changes in demand, the adequate transfer of workers from places of overcapacity to places that require more manpower is one of the most critical issues in terms of human resource management, but especially in terms of economic efficiency.

In 2002 and 2003, the plant in Bremen experienced an overcapacity in the SLK Roadster R
170 production, while human resource capacities were simultaneously required in the C-class production. This time, age became the decisive factor in the selection of those to be relocated and not the normal criteria such as volunteering, qualifications, recent relocations, and selection by the foreman. The aging workforce topic had at that time just recently become an issue on the managerial agenda due to rising absenteeism and the number of constrained workers amongst the older worker group. Normally, the relatively younger and newer colleagues were considered for relocation, but this time it was believed that such an arrangement would leave the ongoing SLK production with a considerable excess of relatively older workers, and an accumulation of related problems. The demographically oriented relocation was thus developed to counter these problems.

Based on the workers’ individual age, the demographic structure of the relocating contingent had to be composed in such a way that it mirrored the structure of all the workers in a “Meisterei,” thus integrating all age groups. This was achieved by first structuring the “Meisterei” in groups composed of the under 30s, those between 31 and 40, 41 and 50, and 50 and above. Next, the individuals in these groups were ranked according to job tenure as another objective decision criterion. The proportion of the age groups of those selected for relocation was similar to those within the overall age structure. Those with the shortest job tenure were selected first. “Demographically oriented relocation” avoided the pitfall of extracting too many young workers from one production hall, thus artificially increasing the average age, while simultaneously accumulating relatively younger ones in the absorbing production facility.

D.4.10. ANALYSIS OF “DEMOGRAPHICALLY ORIENTED RELOCATION”

There are two important findings with regard to the measure that have to be highlighted before attempting the actual evaluation of its effectiveness. First, “demographically oriented
relocation” of personnel is not implemented coherently across the whole plant and, second, there are certain limits and practical restrictions to its application, which originate from day-to-day business. How do our findings illustrate these limitations?

There seem to be significant differences with regard to how relocations are managed, the criteria used, and the extent to which age is one of the determining factors. During the recent introduction of the new C-class model, about two hundred people were transferred from the SLK production. However, this time age was not an important factor in the composition of the relocation contingent. As a shop floor manager in the SLK production explains:

“There is no demographically oriented relocation. (...) During the last relocations, we did indeed use an age structure. We took the (age) structure of the work groups and categorized it according to age and job tenure and not according to qualification. (...) [Today] we are concerned with ‘survival’ in order to produce at all.”

He continues to explain why that is and how the current relocation is organized:

“[Currently] we have switched to a one-shift production of eight and a half hours, but soon we will have a model upgrade. To cope [with increased demand], we will reserve some personnel. To do so, we said we would keep all workers able to perform on all workstations within a single ‘Meisterei,’ because we will need them in future. (...) To accommodate the shop council, we will also keep all group spokesmen and union workplace representatives. (...) Workers above 50 are also not included in the relocation contingent. In general, we did not take age into account [as we already have too little leeway].”

This comment proves that in order to “survive” in the day-to-day business under the current personnel structure, shop floor leaders had to sacrifice some criteria in order to avoid losing important, capable workers for their production. This particular shop floor manager was more concerned with ensuring that there would be enough qualified personnel to handle the future
model launch. Besides those above 50 being allowed to stay, age was not a factor taken into consideration this time. To assess whether this approach was successful as far as the relocated workers’ age structure and the “demographically oriented relocation” system were concerned, we would have had to check the actual relocation contingent. However, since recently relocated workers – mostly relatively younger ones – were exempted from this transfer, and since the above 50s were not included, we believe that this particular transfer might not have been problematic.

A slightly different but definitely more consistent approach with regard to age was applied to the composition of the relocation contingents for the C-class production. A foreman explains how it works:

“[The demographic oriented relocation process] is currently the standard we use to transfer personnel, specifically in this production hall and mostly, because the criteria are so convenient. One takes the age structure of the ‘Meisterei’, checks the distribution percentage and organizes the transfer accordingly. (…) Once we have taken age into account, we do the selection by applying the job tenure criterion. Constrained workers and handicapped people are selected separately. (…) Eventually, the work council double checks.”

This approach is basically consistent with the initially described exemplary process. If relocation from the C-class production to somewhere else is required, the personnel list is structured into ten-year age groups. Within these age groups and in keeping with their percentage in the overall workforce in the ‘Meisterei’, those workers who have the shortest tenure are transferred. This is a simple procedure and, since it is based on obvious, hard criteria, leaves little room for discussion. The foreman confirms that this process works very well and that people accept it. However, he also states that this process has nothing to do with aging workforce management, as it is only used to avoid potential age imbalances, which would appear if, for example, only relatively younger workers were to be transferred.
A personnel manager, who is also responsible as key account manager regarding the aging workforce topic at the plant in Bremen, confirms the foreman’s statements and describes the current approach as follows:

“Every production hall has different personnel requirements, which depend on the model. This has to be managed by relocation. This relocation has to be managed according to specific criteria. There are [however] no unitary criteria for the Bremen plant; the criteria depend on the situation. Sometimes it is age, sometimes it is job tenure, which correlates indirectly with age. There are also other criteria like qualification. In the past, for example in the case of the SLK, we selected according to age. (...) In those days we realized that because we face an aging workforce, we have a specific personnel structure and cannot extract all the young people from one department and accumulate them in another (...) Currently, we use the criterion of job tenure, which largely correlates with age.”

He further maintains that this approach is fully accepted because it is transparent, very easy to use, and gives few reasons for arguments. Qualification, which is difficult to evaluate as exactly as tenure, would lead to more difficulties. He highlights the importance of a well-communicated and conducted relocation process in respect of the overall performance:

“It is plausible that an unsatisfied, or overstrained, or even unchallenged employee will sooner or later take refuge in absenteeism. He or she may not be assigned to an appropriate position, which causes disaffection and is a waste of potential. Much can be destroyed by badly communicated or conducted transfer processes. The work environment in a ‘Meisterei’ changes with relocations. The employees have to have the feeling that they are supported during the process.”

He definitely considers an investment in the necessary time and resources worthwhile in terms of improving the current relocation process.
A member of the work council explains why re-integrating age-related criteria coherently into the relocation processes across the plant might be problematic:

“Very often handicapped people and constrained workers cannot be assigned to a specific new task. (...) We therefore have to assign another person from the contingent to be relocated. (...) [However], due to the lack of new personnel we also reach our limits (...) [In some] departments we already have only two age groups from which to choose our contingent: From 31 to 40 and 41 to 50, that’s it! (...) In these groups, we also have an increasing number of constrained workers and handicapped ones (...) this limits our choice of workstations. (...) It becomes more difficult every year.”

Ironically, a process that was initially also designed to manage age-related imbalances caused by relocation problems, is now actually hampered by the demographic change. Due to the increased number of handicapped and constrained workers – caused by the aging of the workforce – age-based relocation is becoming almost impossible without an increasing number of exemptions. An executive of the HRM department, who is involved in current relocation processes everyday, states:

“We have a specific group of people who keeps on being relocated and these people are getting older. (...) The pool of workers that can be relocated after all the exemptions have been omitted is so small that you would not be able to take action if age were a decisive factor.”

She consequently confirms that “demographically oriented relocation” is no longer practicable due to the already limited fully deployable human resources. This system would leave the foremen incapable of setting up an effective workgroup. This is a clear indication that despite the success of the “demographically oriented relocation” system in avoiding age imbalances, this tool alone will not be appropriate for managing the aging workforce, and can
thus not be considered effective in line with our initial definition. The relocation process as constituted today battles the symptoms of the aging workforce but does not have a preventive character. Furthermore, it is also limited by the current work system and strategy. The shop floor manager comments:

“[The future age development] is going to be dramatic. In 2010 we have another model launch, which concerns me greatly. There is no way to ensure that we have all the personnel we will need by that time. (...) I do not have a solution for this problem. (...) [The future standardization of work processes] will make matters worse. The work cycle will therefore become more intense, contradicting the [needs of an aging workforce].”

D.5. CONCLUSION

We are aware that our study faces some important limitations that have to be considered, especially with regard to the generalization of the results. In this study, we focused on only one DaimlerChrysler plant where our archival research, participant observation, and interviews were conducted. Strictly speaking, that makes our results only valid for this particular observation and in the current organizational and economic environment. However, we accepted this limitation to obtain a deep and thorough insight into our research issues. Despite the specific focus of our data collection and analysis, we believe that our results can largely be transferred to organizations that face similar challenges and have implemented a comparable set of measures.

By analyzing the existing measures implemented at the DaimlerChrysler plant in Bremen with regard to the aging workforce, we aimed at a qualitative evaluation of these in order to assess the contemporary aging workforce management in terms of its effectiveness, i.e. how well related challenges, like health issues, absenteeism and the integration of a constrained
workforce, are addressed. Our study has in fact revealed important insights that go beyond our initial research question: It challenges common management opinion, as well as business research and literature findings on similar tools in other companies and industries, that the steps and measures already being applied are sufficient to counteract the potential downside of an aging workforce.20 One of the most important insights from our researched case is that while a number of tools and measures are subcategorized under the term aging workforce management, they are, first, not specifically intended to target related challenges and, second, cannot prevent the employed workforce from becoming older on average, for they are only concerned to address the related symptoms in the short-term. A restrictive hiring policy combined with an increasing average age will eventually lead to an increasing number of people with physical problems related to aging, thus challenging the potential capacity of the described measures and tools.

We believe that successful and sustainable aging workforce management is still feasible, if appropriate and customized solutions were to be designed according to the challenges faced by each plant and/or company. We strongly recommend that the decision to implement aging workforce management should be based on financial data to ensure that it is economically sound: The costs of an aging workforce can be calculated in terms of the potential increase in sick leave and constrained workers. The same applies to the costs of new hires, the insourcing of workstations suitable for constrained workers, and similar measures. Since we believe that facing increasing problems due to an aging workforce and the hiring of and investing in new employees both lead to a significant financial burden, choosing short-term reactive or long-term proactive measures should be based on the most cost effective solution. If a company or plant’s workforce has a larger percentage of older age structures, such investments cannot be avoided. We therefore recommend creating the necessary financial provisions as early as possible.
D.6. REFERENCES


1 For a detailed elaboration on the potential effects of an increasing age average on societies refer to, e.g., DeLong (2004), Dychtwald/Erickson/Morison (2006) or World Bank (1994).

2 Potential issues resulting from the aging of societies with regard to social security or the welfare state can be found in Razin/Sadka/Swagel (2002) and Wray (2006).

3 See, e.g., Leibold/Voelpel (2006).


5 For seminal work on age and performance see Avolio/Waldman (1990), Avolio/Waldman/McDaniel (1990), Kanfer/Ackerman (2004), McEvoy/Cascio (1989) and Waldman/Avolio (1986).


7 Seminal work referring to early issues and concepts of managing an aging workforce can be found in, e.g., Batten (1980), Leonard (1989), Paul/Townsend (1993) and Sonnenfeld (1978).

8 Apart from Yin (2003) our approach to case study research is influenced by the works and contributions of Denzin/Lincoln (2005), Lee (1999) and Stake (1995).


10 Why this approach is suitable for this particular organizational setting is in more detail explained in Snow/Thomas (1994). Streb/Voelpel/Leibold (2008), on the other hand, give a detailed overview about the contemporary status quo of aging workforce management in both practice and research.

12 See Snow/Thomas (1994) and May (1997).


14 Dane (1990) provides details on passive observation in this methodological context.

15 See Healey/Rawlinson (1993) on more details about developing interview guidelines.

16 See, e.g., Creswell/Miller (2000).

17 Cycling reading as a means of qualitative coding and subsequent analysis is described in, e.g., Stratton (1997) and Strauss/Corbin (1990).

18 Participation in this measure is voluntary. Workers can partake whether they already have back muscle problems or not.

19 See, e.g., Creswell/Miller (2000).

E.1. SUMMARY OF DISSERTATION ARTICLES

It is the general objective of this dissertation to clarify fundamental concepts regarding the evolving topic of aging workforce management by exploratory means to provide the scientific community with the necessary seminal basics to build a common understanding of the topic, as well as to address the existing research gaps.

In order to achieve this goal, this thesis focuses on three specific objectives that were approached in three studies and presented in separate articles. As a first step, it was necessary to identify the status quo of aging workforce management from a management science perspective in both theory and practice. Based on the results of this status quo analysis, further research gaps could be identified. Those which appeared to be the most crucial ones with regard to the overall objective of the thesis were subsequently addressed in the two continuative studies: First, the aging workforce challenge was defined and the constituting elements of aging workforce management were identified. Second, applied aging workforce management tools and measures were evaluated with regard to their effectiveness.

While it is a logical step to primarily approach a new field of study through a literature and case review, the detailed formulation of the specific objectives of the second and third articles were clearly influenced by the identified research gaps through the status quo analysis. Each study is described in detail in terms of an article in the main section of this thesis. In the following, the author briefly summarizes the key findings from each study.

E.1.1. SUMMARY OF RESEARCH FINDINGS: ARTICLE I

The first work offers a review of the Financial Times Top 40 journals, identifying the status quo of the topic from a business management perspective, thus deducing and proposing
potential research gaps for theory and practice. The results indicate that although research has been conducted on a variety of aging workforce issues, a business management perspective has to date been neglected. Important issues raised in the first article refer to the lack of a definition of the aging workforce challenge, of aging workforce management in general, as well as the lack of specifically designed practical measures to meet the challenge, thus raising concerns about the measures implemented currently. Although some companies are already approaching the aging workforce topic with selected managerial measures, none of these were originally designed to manage an older workforce. Therefore, and in order to identify potential inefficiencies in aging workforce management, the existing measures had to be evaluated.

<table>
<thead>
<tr>
<th>Action Fields</th>
<th>Articles</th>
<th>Selected Case Examples</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Management</td>
<td>Maurer and Rafisse, 2001, Maurer, Weiss and Barbeite, 2003, DeGroot and Kiker, 2003</td>
<td>General Electrics, LVM, Lufthansa, Siemens, DaimlerChrysler</td>
<td>Deals with older employees' ability to learn and organizations ability to retain and transfer knowledge between generations</td>
</tr>
<tr>
<td>Health Management</td>
<td>Cropanzano, Rupp and Byrne, 2003, DaimlerChrysler, BMW, E.ON, Volkswagen</td>
<td>BMW, Adecco</td>
<td>Deals with the preservation and strengthening of the physical performance of older employees</td>
</tr>
</tbody>
</table>

**Figure E.1: Status Quo Overview in Article I.**

Figure E.1 provides a broad overview of the review findings from the first article. It is clear that the results were structured according to the five action fields described by Leibold and
Voelpel (2006). The exact content of each field, findings, and the case examples are described in detail in the article.

Apart from the described result in the article, there is apparently a rather unbalanced distribution of identified literature and cases across the five fields. “Work Environment and Ergonomics” is represented by nine articles, “Managerial Mindset” by five, compared to only two articles on the fields of “Knowledge Management and Learning” and “Health Management”. On the other hand, these two fields have, respectively, five and four identified cases. The author could only identify two cases on the field of “Managerial Mindset” and “Work Environment and Ergonomics”. At a first glance, this could be interpreted as a diametrically opposed focusing of research on the one hand and management awareness and efforts on the other. If this is indeed true, future research efforts would probably have to adapt their objectives. One could conversely argue that management is actually neglecting important issues that need urgent attention.

However, there are no sufficient data to actually prove these assumptions. Moreover, it would be dangerous to judge the quality of the efforts by the quantity indicated here. It is important, though, to align research efforts with practical requirements. Vice versa, management could more actively benefit from conducted research that would ensure a practical impact.

From the article has already concluded and from what the author has added above, the following findings can be summarized with regard to the status quo of aging workforce management:

1. There is research on specific issues related to the aging workforce; however, it is still underrepresented in managerial science. A specific focus on aging workforce management is still lacking.
2. According to the literature, phased retirement can be a valuable aging workforce tool for the individual and the organization.

3. There is no scientific proof that an older workforce is less productive or more problematic than a relatively younger one, provided the right organizational measures are applied.

4. Management is addressing the issues of an aging workforce in all five dimensions; however, an integrated overall strategy and specifically designed tools are still lacking.

5. Research and management appear to put different emphasis on certain issues of aging workforce management.

Following the article’s research findings and the summary, the first study suggests the following further research questions:

1. What are an older workforce’s potential performance weaknesses and strengths with regard to specific industries and occupations?

2. What new and specific tools have to be developed to counteract an older workforce’s potential downsides and to leverage its potential advantages?

3. How does an appropriate organizational mindset and leadership influence the effectiveness of existing measures with which to manage the aging workforce? How does this affect the development and implementation of new, specific tools?

4. Is there a difference in the way research and management perceive and approach aging workforce management? If so, what is the reason or reasons for this?
5. Since there is no information available in the current theoretical literature, how can the challenge of an aging workforce be defined and what elements constitute aging workforce management?

6. If tools specifically designed to manage the aging workforce are still lacking, how effective are the measures that are currently found in practice and what does this mean for the development of new, focused tools?

E.1.2. SUMMARY OF RESEARCH FINDINGS: ARTICLE II

The second article addresses one of the important further research questions identified in the first article. There can be little doubt that it is paramount for the theoretical advancement of a research field to provide the required definitions and constituting elements of the topic under examination. Consequently, the second study focuses on this issue by describing how, in an analyzed sample from the automobile industry, the aging workforce challenge can be defined and the other elements that constitute aging workforce management. It appears that the drive for “competitiveness” and the interplay between “measures aspiring competitiveness” and “aging workforce symptoms” are major constituting elements, while “measures addressing the aging workforce challenge”, the “human factor” and “leadership” are key to understanding aging workforce management in general.

Figure E.2 illustrates the coding process, the resulting categories, and the interpretation described in the second article. From 142 open codes that the author identified from cyclic readings, six culminated from axial coding and, through selective coding, their basic relationship with one another became obvious. Through this process, which is common in grounded theory, it was possible to answer the second specific objective of this thesis,
supported by the status quo review in the first article. The precise answers to this research question can be summarized as follows:

1. Competitiveness is the major driver of aging workforce management efforts in the automobile industry.
2. The challenge of an aging workforce is defined as the interrelation of measures aiming at improving competitiveness and the potentially counteracting aging workforce symptoms.
3. Measures addressing the aging workforce, the human factor, and leadership are the constituting elements of aging workforce management.
4. The elements constituting aging workforce management are found in any organization irrespective of whether it has an older workforce. It can be argued that, consequently,
no newly developed measures are required to address the aging workforce specifically.

5. Similar studies have to be conducted in other industries to validate and confirm these results of this study.

From the summarized findings above, the following potential research questions to advance our understanding of the topic can be deduced:

1. Can the definition of the aging workforce challenge with regard to the automobile industry be affirmed if the study is repeated in other industries?
2. What elements would constitute aging workforce management in other industries? What would be similar, different and could explain such similarities and differences?
3. How exactly do the defining and constituting elements identified in this study interrelate with one another? Most importantly, how does leadership influence the human factor?
4. Can the constituting elements of aging workforce management be identified and thus be affirmed in practice?

E.1.3. SUMMARY OF RESEARCH FINDINGS: ARTICLE III

The third article refers to another important research question raised in the first article: How effective are the current tools and measures applied in aging workforce management? Since the first study proved that existing tools are not specifically designed and implemented to address the aging workforce challenge, this becomes an important question to answer, as new tools might have to be developed urgently.

The study provides an overview of the effectiveness of applied, representative tools and
measures aimed at managing the aging workforce at Daimler AG in Bremen. The “Kraftwerk Mobil”, “Fit-Shop”, “Rotation”, “Ergonomics” and “Demographically Oriented Relocation” are all valuable and effective tools in respect of the purpose for which they were initially invented. However, this purpose usually only concerns some of the aging workforce symptoms, which was already anticipated in the first article. Although it is still not clear whether the aging workforce provides an organizational challenge that truly differs from others and therefore requires a specific tool set, the potential downsides of neglecting demographic developments trigger an urgent call for a holistic approach to address the aging workforce challenge from a long-term perspective and with specifically designed tools and measures.

With respect to each tool the findings can be summarized as follows:

1. However effective the analyzed measures in the sample may be (in terms of what they intend to achieve), they were not originally designed and implemented to address the aging workforce challenge as a whole. They merely address certain symptoms of an older workforce that have now gained new importance.

2. It is still unclear what the immediate effect of all the measures is regarding improving competitiveness (e.g., in terms of health status). Effects from other factors are difficult to isolate in an organizational setting.

3. The effectiveness of some tools, like “Rotation” or “Demographically Oriented Relocation”, are actually negatively influenced by the aging of the workforce.

4. None of these tools and measures takes a long term, holistic aging workforce management into consideration or actually addresses the source of the challenge, which is the continuously increasing average age of the workforce.

5. Although the collected and analyzed data can only be validated in respect of this
specific sample, it can be argued that aging workforce measures introduced in similar organizations face similar limitations with regard to their effectiveness.

A number of important future research questions arise from the above:

1. What is the immediate effect of the analyzed tools and measures on the competitiveness of an aging workforce and how do they interrelate with one another?
2. How effective are the tools and measures applied in other organization and industries? To what extent does this differ from the sample analyzed here? What factors are responsible for the difference?
3. How can other potential measures, like hiring new people, job succession, insourcing, workstations, the creation of a working life career, job-matching, or new retirement and part-time models support the creation of a competitive workforce in the light of the increasing number of older workers?
4. Is a new tool specifically designed to manage the aging workforce actually necessary or is it sufficient to subsume existing tools that address the most evident symptoms of an aging workforce?
5. What qualifies aging workforce management as a new field of study?

Together, the three articles offer the reader a comprehensive overview of the current developments of aging workforce management. To overcome the preliminary character of the results, which originate from a strong focus on the analyzed samples, further research on specific details of the findings and a transfer to other industries are required. Qualitative approaches following the works and guidelines of Yin (2003) or Miles and Huberman (1994), for example, appear to be very helpful.
E.2. SYNTHESIS OF DISSERTATION ARTICLES

The synthesizing of the results of all the studies in thesis, especially those from the second and the third article, will provide additional insights that go beyond what is stated in the sections above. These additional insights are due to the articles being part of a general research aim – to explore aging workforce management and to clarify its fundamental concepts – although each study addresses a specific research objective. The findings of each article complement and entail one another to a certain extent. Owing to the focus of the articles and space limitations, the additional synthesized findings that are presented next were not part of the accepted and submitted articles, but provide an additional value to the cumulative thesis by addressing the general research objective.

One of the most important findings of the first article is that although there is research and there are applied measures with regard to the aging workforce, these efforts do not go beyond addressing the symptoms of an older workforce the literature or in practice. There is a lack of a specific reference to an integrated concept of aging workforce management. This finding from the status quo review is proved by the second and the third articles. Here, too, tools and measures were not originally designed and implemented for the managing of the aging workforce. The term “aging workforce management” merely appears to be a label assigned to a set of tools that already addresses relevant, symptomatic issues. It can be argued that in the absence of a clear concept of aging workforce management, it is necessary to first develop a clear understanding of what the topic comprises and how effective the current toolset is, if it was not originally intended to address older workers’ needs. This issue is specifically addressed in the second and the third articles. Besides answering specific research questions, these two articles thus also point to two very important elements that are critical in understanding aging workforce management and that can be considered a crucial synthesized
The second article identifies constituting elements of aging workforce management, namely “measures addressing the aging workforce challenge,” “the human factor,” and “leadership.” “The human factor” is described as an element of subtler and subconscious areas that can negatively impact the implementation of measures aiming to increase the competitiveness of an aging workforce. Typical examples are the short-term thinking of managers by focusing on short-term key financial figures, the workforce’s individual interests, and a lack of motivation and self-responsibility in terms of, for example, health care. This could also include other related or similar factors not specified here, as “the human factor” still has to be regarded as a conundrum. “Leadership”, on the other hand, is described a factor that can either positively or negatively influence “the human factor” by showing appreciation of and care regarding the worker’s needs and problems. This is how the necessary motivation, commitment, and self-responsibility, which is so important for successfully implementing aging workforce measures, should be created.

The author proposes that by synthesizing these findings with the results from the third article, additional new knowledge – besides that already stated in the articles – can be gained. The “measures addressing the aging workforce challenge” for the Mercedes-Benz plant in Bremen – the “Kraftwerk Mobil”, the “Fit-Shop”, “Rotation”, “Ergonomics” and “Demographically Oriented Relocation” – are clearly stipulated in the third article. By reviewing the results stated in the third article, it can now be verified whether and how “the human factor” and “leadership” play an important part in aging workforce management as described in the second article. In the following, each measure will be briefly reviewed with respect to these two constituting elements of aging workforce management.

As a matter of fact, this finding directly addresses another research question that resulted from the second article, i.e. if constituting elements of aging workforce management can be identified, and thereby affirmed, in practice.
E.2.1. KRAFTWERK MOBIL

In the third article, this tool is described as a mobile training unit – directly applied at the production lines – aimed at improving the balance between and suppleness of the abdominal and back muscles. It is conveniently accessible, and provides a low threshold, thus also accommodating “human inertness” that could potentially prevent individuals from a self-responsible commitment when it comes to staying healthy. The central idea behind this tool is to increase motivation – a core element of “the human factor”. It is considered to be very successful in improving the work climate through self-motivation. A factor that cannot be underestimated when it comes to building trust in respect of this tool is that the trainers are also production line workers. The employees do not have a built-in resistance against this measure as it does not seem to be imposed “from above.”

This tool has a strong link to “leadership.” The interview quotes in the third article clarify that the “Kraftwerk Mobil” is perceived to acknowledge the physical problems that many workers experience at their workstations. This is recognized as management’s commitment to and care regarding the workforce’s problems; especially since it is known that this training unit engenders significant costs. These costs are not only the direct costs related to its purchase, but also the costs related to allowing the workers to use the “Kraftwerk Mobil” during working hours. Management also proves its “leadership” skills by employing former production line workers leaders as trainers. These former workers understand the potential human factor barrier that could impede the successful implementation of this tool.

The “Kraftwerk Mobil” example clearly supports “the human factor” and “leadership”, as well as their interrelation.

E.2.2. FIT-SHOP

This measure is described as a physiotherapeutic practice and fitness centre with a
multimodal service range and multidisciplinary staff on the plant’s premises, which is
tailored to the specific health issues (especially musculoskeletal injuries) and needs of the
workers at the Mercedes-Benz plant in Bremen. As an autonomous business unit it is –
organizationally – not related to Daimler AG. A membership fee is required but is much
cheaper than other external fitness centers. Referrals, for example, for physiotherapy can be
made directly by the plant doctor and therapeutic programs can be tailored to shift and
working schedules. In some cases, the “Fit-Shop” employees customize their treatments to
the workers’ individual needs by analyzing their workstations.

Again the issue of motivation with regard to “the human factor” is a crucial one, as can be
deduced from the interview quotes. The cheap membership fee and the location within the
plant lower the threshold for actual participation and to integrate fitness and health into
workers and employees’ daily agenda. If management wishes people to attend such a “Fit-
Shop”, they have to make it attractive and convenient for them. Moreover, the autarky of the
“Fit-Shop” is very important since, as revealed by the interviewees, some of them do not
want details about their physical health to be accessible to their employer.

Interestingly, the issue of motivation is also highlighted from another perspective. Some
individuals are not motivated to become healthy again, because as long as they are regarded
as constrained workers, they are employed at easier workstations at full pay. Self-
responsibility and commitment are thus additional factors that again refer to “the human
factor” as stated in the interviews. With regard to “leadership,” it is important to acknowledge
this issue and to react by developing an organizational culture where health and commitment
is valued. Similarly, one interviewee observed that organizational changes that are perceived
negatively by the workforce have a direct impact on the health status as well. This does not
only refer to stress, but also to people who feel unappreciated, and therefore use any excuse
to stay away from the workplace. The interviews emphasized the importance of
acknowledging and reacting to such factors through appropriate “leadership”.
When reviewing this tool, “the human factor” and “leadership” are highlighted, especially their potential interrelationship. The threshold for participating in health measure has to be low and the workforce has to be motivated to show commitment by actively creating the right organizational culture.

E.2.3. ROTATION

The term “rotation” refers to the alternating deployment of employees on the production lines during a shift. This action is described in detail in the article. Generally, “rotation” is intended to vary physical strain – thus avoiding long-term physical harm – and to enrich the individual’s job. Consequently, the motivational factor is again addressed. The article describes how workers tried to increase their skills in order to be deployed in many different workstations. Although, the motivation was mainly the higher salary linked to a broader skill set, it seems to be clear that “rotation” is appreciated as a motivational factor on the production line.

However, from a “leadership” perspective, “rotation” has to be limited to an optimal level where the mastery of the work content still ensures the required quality. Too much “rotation” might lead to individual workers not being familiar enough with the various workstations. While “leadership” is an important instrument to foster motivation in the previously mentioned measures, here it is required to regulate the optimum standard between “the human factor” issue of motivation and job enrichment due to “rotation”. This regulatory role is a positive factor with regard to the aging workforce and especially health in general, although too much “rotation” could also lead to a serious lack of skills and quality. If one disregards the actual impact that “rotation” could have on the aging workforce in the organizational setting of the Mercedes-Benz plant in Bremen, the important role and
interrelationship of the two elements “the human factor” and “leadership” have once again been proved.

E.2.4.  ERGONOMICS
This particular measure includes a whole variety of issues and tools as described in detail in the third article. Basically, it refers to the balance between workplace requirements demanded of humans and humans’ demands in terms of the workplace. Balancing these sometimes quite contradicting issues is increasingly important with regard to the aging of the workforce. There can be little doubt that an improvement in the ergonomic conditions at the production line could accommodate the changed physical needs of older workers more appropriately. However, it became clear during the interviews that “ergonomics” is a mainly budget-driven measure that does not at yet directly respond to the aging workforce needs. The impact that it could have in terms of motivation, self-responsibility or general commitment is hard to measure, since it could be regarded as a hygiene factor on the current production lines. Although, the interviewees do acknowledge a potential relationship between ergonomic measures and illnesses, the potential impact of appropriate ergonomic measures focusing older workers is ignored due to financial constraints. Consequently, “the human factor” and “leadership” could not be identified as issues directly from what was gained in the interviews. More research is required on the motivational impact of ergonomic measures and the role of “leadership”.

E.2.5.  DEMOGRAPHICALLY ORIENTED RELOCATION
This measure refers to the relocation of workforce contingents within the plant according to the demand for and utilization of certain production facilities by applying age and job tenure as a decisive factor.
Motivation can be an important factor when it comes to this kind of relocation. One of the major reasons for this approach actually being introduced is that shop floor managers wanted to introduce a clear objective measure to avoid complaints and resistance from employees when they have to switch work places. Management is obviously aware that workers develop a clear preference for the job to which they have become accustomed and that significant changes are not appreciated. Thus, unwanted relocation can affect motivation, thus indicating the meaning of “the human factor”.

<table>
<thead>
<tr>
<th>The Human Factor</th>
<th>Leadership</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kraftwerk Mobil</strong></td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Fit-Shop</strong></td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Rotation</strong></td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td><strong>Ergonomics</strong></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Demographically Oriented Relocation</strong></td>
<td>++</td>
<td>+++</td>
</tr>
</tbody>
</table>

Schematic Interpretation: +++ High; ++ Medium; + Low; - n/a

Figure E.3: The Potential Impact of “The Human Factor” and “Leadership” on the Successful Implementation of Aging Workforce Measures (Schematic Interpretation).

If, for example, relocation takes place from production areas with extended cycle times and a more relaxed work atmosphere to areas where utilization and work load are much higher, this could cause the disaffection of the workforce. Furthermore, this could have an impact on
other issues, like motivation or commitment. Therefore, relocation is a critical process, which requires the “leadership” to show sensibility if it is to be applied effectively.

The motivational issues behind relocation processes have to be acknowledged as well. An effective management communication is key. Only then can motivation and commitment be maintained and the potentially beneficial outcome with regard to an aging workforce be realized. Figure E.3 provides an overview of the findings described in this section.

E.2.6. SUMMARY

It is quite obvious that the meaning of “the human factor”, especially motivation, as a potential hurdle to or catalyst for the successful implementation of measures addressing the aging workforce challenge is crucial. Its existence seems to determine and explain the potential effectiveness of aging workforce measures. Moreover, “the human factor” can be influenced by appropriate “leadership” that acknowledges and controls the long-term sustainable success of aging workforce management by always taking the specific needs, requirements, and concerns of the affected workforce into account. This interrelationship is illustrated by Figure E.4.

At the core of this figure, there is the aging workforce challenge as defined in the second article. As it is indicated by the accumulated results of this thesis, aging workforce management tries to approach this challenge by means of corresponding measures. However, these measures can be influenced by “the human factor” and “leadership”, as it is described in the second article, whereas the importance of these two constituting elements of aging workforce management are enhanced by the findings of the third article. “The human factor” can provide a significant barrier to the success of aging workforce measures, while the right “leadership” can address and manage this appropriately.
It is recommended that future research should focus on the relationship between these two elements specifically, since developing an advanced understanding of aging workforce management will be impossible without a clear concept of how these two elements interrelated with each other in aging workforce management.

E.3. IMPLICATIONS FOR RESEARCH AND PRACTICE

When considering the combined findings of all three articles, including the recommendations for the further advancement of related studies, the following important question arises: Has the general objective of this thesis – to seminally explore the topic of aging workforce management and to clarify fundamental concepts – been met?
First, the status quo of aging workforce management has been identified in relevant management literature and important research questions have been deduced. In a next step, the two research questions that seem to be the most valuable in respect of advancing the understanding of this evolving field of study were addressed: A definition of the aging workforce challenge and the constituting elements of aging workforce management in theory were identified, while the effectiveness of applied aging workforce management tools and measures in practice was analyzed. In addition to meeting the relevant research objectives, the findings from the second and the third article support the meaning and importance of “the human factor” and “leadership” for successful and sustainable aging workforce management, while simultaneously raising a number of new research questions.

In the light of the extended quantity and quality of the findings, as well as the identification of further important research questions, the author of this thesis believes that it has indeed been possible to meet all the goals of the specific objectives, thus also addressing the general objective of this thesis. Of particular value for an evolving field of study are the identified research gaps, which are illustrated in Figure E.5. Starting from the general research objective, specific objectives were addressed in three studies and consequently answered by means of appropriate methods. These findings from the three studies result in an even greater expanded field of research. It will be necessary to answer the questions raised in order to validate the results of this thesis, to advance our understanding of this field in future, and to eventually develop a new theory or model of aging workforce management.

According to Figure E.5, future research will have to develop appropriate and individual approaches for each of the presented research gaps in order to improve science’s knowledge of aging workforce management. Providing detailed research proposals for each question would be helpful for future researchers, but this would be far beyond the scope of this thesis. However, in order to facilitate adjacent studies, the author wants to point out two research
questions from Figure E.5 which that are, in his opinion, the most urgent and will add the most value to theory development.

Figure E.5 only refers to these future research questions that were not directly addressed in the articles in this thesis.
1. Would repeating the grounded theory study of the second article of this thesis in other industries affirm the definition of the aging workforce challenge with regard to the automotive industry?

2. Is a tool, originally designed to manage the aging workforce necessary, or is it sufficient to subsume existing tools that address evident symptoms as is done in the case study of the third article?

To answer the first question: the complete study should be repeated in another industry. Since the automotive industry, at least within the scope of this thesis, relies heavily on physical work and is therefore first and foremost concerned with the physical dimension of aging, it is extremely important to broaden the definition as described in this thesis by analyzing a knowledge intensive industry. DeLong (2004) has already pointed towards two other crucial issues with regard to an aging workforce: the potential loss of knowledge when experts retire, as well as the issue of innovativeness in respect of increased age. This generally applies to all companies and industries where knowledge is a decisive competitive factor, such as software development, consulting, and/or engineering in general.

The author recommends choosing a proven knowledge and/or innovation-intense sector or industry and focusing on it with exactly the same methodology and research steps as described in the methodology section of the second article of this thesis (see chapter C.3). Semi-structured interviews should mainly be conducted – participant observation will not always be possible – that are subsequently coded and analyzed in keeping with Glaser and Strauss (1967) as well as Miles and Huberman (1994). The author believes that the quality of the studies provided in this thesis could have been significantly improved in terms of their reliability, as well as their presentation if qualitative data analysis software, such as ATLAS.ti and/or NVivo, had been used. The application of such supportive software is therefore strongly recommended.
The author hypothesizes that the result of such a repetitive study should not differ all that much in terms of the definition of the aging workforce challenge from that of the automotive industry. Furthermore, competitiveness, the measures aiming at achieving competitiveness, and the potential threats resulting from a demographic change in the workforce should strongly focus on knowledge and innovation issues. Such a result would both broaden the scientific understanding of the topic and provide a basis for generalizing the proposed definition. Moreover, such a result would strongly support and affirm the findings of this thesis.

With regard to the second question, the author would recommend a different approach. In order to really answer the question whether an original tool is necessary or whether the applied, subsumed ones are sufficient, it would be necessary to analyze the question via a long-term case study within this specific organization. The intention should be to clearly identify the effect of the applied measures. This would require reliable quantitative data about the direct effects of these tools on, for example, the health status. Moreover, validity would have to be ensured by clearly constructing and proving cause and effect. This could specifically be supported by a long-term study design. If possible, quantitative, valid data on the health status before and after the introduction of certain measures – and perhaps after these measures have been terminated – need to be obtained. The identified results could, for example, be matched with the required health status numbers of the organization. If requirements have been met, then obviously a new tool would not be necessary.

However, in terms of such a research design, it is clear that it would be extremely difficult to ensure the validity of data within a real organizational setting. It would, in fact, be extremely challenging to ensure indisputable cause and effect relationships between specific factors. It is therefore the first task of adjacent explanatory research to find ways of constructing such interrelationships by singling out other potential interfering factors.
The author of this thesis is, however, confident that by applying the suggestions made in the three articles and by doing similar studies in other industries, the presented results could be appropriately enhanced and improved, eventually developing into a new theory. The same holds for business practice, which could find the suggested approaches to aging workforce management at the end of the case study, as well as the work by Leibold and Voelpel (2006), very useful.

Besides that which has already been stated above, the following general recommendations are offered to practice and science. As a review of the current status quo on the topic, the first article could serve as a useful tool to update managers in terms of prevailing academic developments from a business management perspective, as well as providing practical examples. The short cases from across industries could lead to benchmarking against the challenges that other companies face and the ways in which they manage their aging workforce.

Such a benchmarking requires, as a matter of course, a thorough analysis of the own aging structure now and in future, which should include potential business developments and the resulting competitive challenges of an aging workforce.

A key point from the second article is that as a challenge and a managerial topic, aging workforce is not necessarily only concerned with older blue-collar workers and employees, but also with the challenges resulting from other business trends such as increasing competition. Moreover, aging workforce management deals with the same issues faced by any other management topic requiring significant organizational change. The “human factor” and appropriate “leadership” play decisive roles. This implies that not only might it be appropriate to apply conventional tool sets (at least in the short term and for some aging workforce symptoms), but it is also very important not to neglect the soft factors in organizations. The motivation of the workforce and its determining factors should
The third article allows for benchmarking in terms of comparing existing tool sets and evaluating their effectiveness. The measures analyzed in the case study have a proven record of success, although only with regard to aging workforce symptoms. However, specific attention has to be paid to the development of long-term measures addressing the sustained competitiveness of organizations under the impact of demographic change. The possibilities range from the timeous hiring of new people and ensuring timeous job succession to the insourcing of workstations for constrained workers, developing a working life career, the advanced matching of job requirements and worker capabilities, and the development of new retirement and part-time models.

As a lesson learned, appropriate and sustainable aging workforce management entails the following elements: First, a realistic analysis needs to be conducted of future demographic developments within the organization and their potential impact on organizational competitiveness with regard to the expected alterations in the business environment. Second, available short-term measures (e.g., in health management) need to be aligned to counteract the most urgent negative effects of an aging organization. Finally, these tools and measures need to be integrated into a holistic, long-term approach to managing the workforce with regard to a sustained competitiveness concept aligned with future business requirements and the company strategy. “The human factor” and appropriate “leadership” are important factors that require specific attention.

Besides the findings of this thesis, as well as the research questions that have to date gone unanswered, and which need to be addressed by subsequent studies, a valuable recommendation for advanced research might be to look for potential new research gaps and to answer the existing ones that lie beyond the scope of this thesis and occur where least expected. A potentially highly valuable research stream could result from the combination of
conventional advanced research on aging workforce management, as presented in this thesis, with intersections from entrepreneurial research. This issue is not directly addressed by the research and findings of this thesis; however, the author believes that the consideration of relevant work could provide valuable insights into and recommendations regarding the direction aging workforce management might develop in the long term.

An example of such work is the contribution by Baumol, Litan and Schramm (2007), who in their recently published book emphasize the key role of entrepreneurship for economic prosperity in capitalism. On page 28 and the following pages, they highlight the contribution of economic growth to aging of societies, which can be witnessed worldwide. They also point out the irony that it is exactly this aging of societies that could threaten future economic sustainability. They expect US governmental spending on social security and social health programs to increase from their present level of 5 percent of gross domestic product (GDP) to 13 percent in 2025, and 19 percent in 2050 (Baumol, Litan and Schramm, p. 29). In order to avoid a collapse of the governmental budget and to allow for adequate care for the growing number of potential – mainly older – recipients, the authors argue that the only solution is a significant increase in annual GDP growth to 3 percent and more, which could positively influence the ratio of GDP to governmental spending. The question is, of course, how this economic growth could be achieved and maintained over a longer period. Baumol et al. (2007) maintain that this would be possible by fostering entrepreneurial activities in economies, as only this can produce and sustain such growth rates.

This hypothesis links aging workforce management to entrepreneurship, as well as to a potential solution regarding how the welfare state could cope with the downsides of aging. Although the author of this thesis does not know whether this is a realistic solution on a macroeconomic level, some companies have already started to create spin-off companies, which could be regarded as corporate entrepreneurship, to employ an older, often
constrained, workforce. They consequently work on value-creating tasks and in more flexible working environments than those usually found on production lines, for example. The point is that those workers are once again employed in an economically viable way. Existing examples prove that such deployment not only benefits the companies but also the individual workers. The author would thus recommend focusing future research efforts on the question of how entrepreneurship in an aging society can create macroeconomic, as well as microeconomic competitiveness.
E.4. REFERENCES (SUMMARY, SYNTHESIS, AND IMPLICATIONS)


