

INDUSTRY 4.0 AND ITS FUTURE STAFF. MATCHING MILLENNIALS PERCEPTIONS OF A PERFECT JOB WITH THE REQUIREMENTS OF DIGITALIZATION

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Abstract

Against the background of a digitalizing industry (industry 4.0) the question of how companies and future staff are prepared for these changes is becoming increasingly important. That is why the focus of this empirical-experimental study was put on the investigation of the choice of job of Millennials and their requirements on the ideal workplace. The perspective of high potentials within the group of Millennials was collected by means of two focus groups (n=8) which were carried out prior to the main study, a quantitative conjoint study (n = 165). By applying conjoint analysis, the study empirically investigated the relationship between the *attributes job tasks, flexibility, family-friendliness, and salary*.

Keywords

Digitalization, Industry 4.0., Work place design, Millennials,

1 CHALLENGES OF FUTURE WORK

Production systems are not like they used to be. The 21st century will challenge enterprises and manufacturing companies with completely novel generations of technologies, intelligent data services, and products based on computer technologies [1]. In order to meet competition on global markets and to ensure long-term success, the companies need to adapt to shorter delivery times, increasing product variability, and high market volatility. This adaptivity and resilience enable enterprises to sensitively and timely react to continuous and unexpected changes [2]. Aggravating, companies face additional challenges that are based on social transformation processes: Triggered by the demographic change work environments are confronted with a decreasing amount of employees, and a shortage of skilled labor. The increasing portion of aged workers have a high process knowledge and work experience, however, lack of the skills with respect to using novel computer technology and data science. In today's knowledge society, companies heavily depend on their employees' knowledge and skills, but also on their flexibility to tolerate fast changes, to take on responsibilities for work-related decisions, and a high resilience towards disruptive processes. Therefore, they need to successfully attract, recruit and keep qualified employees and high potentials. To do so, it is essential to know the prevailing needs and desires of their (future) employees [3]. That is why currently, the next generation of workers, the so called Millennials are in the focus of interest of employers as well as research. It is essential to understand how they will experience an increasing digitalization of work and if there will be a change of claims and desires concerning fulfilling work in contrast to previous generations. Thus, the overall challenge is to balance changing demands of workers, the nature

of work (industry 4.0), and market pressure (high volatility, high disruptiveness, shortage in workers).

1.1 Industry 4.0 and the digitalization of work

The concept of industry 4.0 describes the digitization of industry, the technological change of production and the change from a computer-centered world to the so-called Internet of things. In the Internet of things processes, devices, objects and environments are networked with each other via the Internet and controlled by software [5]. This transformation leads to a fundamental change in the way people will work in the future. From today on, work processes will be more networked, digital and flexible than ever before. For the working population and future employees, this means that established working methods are shifting and that skill requirements are subject to change. Overall, work processes are becoming easier and more efficient [6], as are the complex technical processes, which are also to be made safer by industry 4.0. Due to the fact that Industry 4.0 triggers processes of change in industrial production that are not yet fully foreseeable it is essential to actively or actively shape these processes and to take account of all the actors involved.

1.2 A new generation of workers

In addition to the technical changes within industry 4.0, the work itself and the challenges for employees are also affected by social transformation processes: on one hand the demographic change comes along with a shrinking number of employees, the loss of person-immanent knowledge, and a threatening lack of skilled workers [7]. On the other hand, a new generation of workers, the so-called Millennials, is entering the labor market [8]. Both aspects are addressed in the following sections.

1.2.1 Demographic change

One of the most discussed megatrends in western industry nations and with far-reaching effects on the working world is the demographic change [9]. The associated changes lead to a decline in Germany's population and an ageing society. This will strongly impact the composition and the availability of the working population. Today the 40 to 60-year-olds make up a large proportion of the working population. If this age group is eliminated, the 1970s and 1980s will follow [10]. As a result, the number of employees will fall from 40.6 million to 39.2 million in 2030 and the supply of skilled workers will fall significantly [11]. In this situation companies must recruit and retain highly qualified employees from the shrinking number of employees which will reinforce the fight for high potentials. This fact leads to an increasing interest in attracting future employees. At present, it is the generation of people born in the 1980s and 1990s, the so-called Millennials, who are increasingly put in the focus of interest. What distinguishes this new generation of workers from their predecessors is outlined in the following section.

1.2.2 A new generation of staff

Due to the fact that the future of work will be marked by a struggle for high potentials, the next generation of employees and their specific characteristics will become increasingly important in the next years. That is why today Millennials and their demands and ideas of a perfect job are in the focus of interest. Different studies revealed the existence of generation specific characteristics: Research shows that this generation is characterized by a high degree of individualism, many choices and volatility [12]. Klaffke and Parment (2011) e.g. describe that they are driven by the goal of self-realization, which is why frequent changes of employer, flexible working time models, as much freedom and autonomy at work as possible [13] are prerequisites for achieving their goals. Their strong self-confidence results from demographic developments and the (imminent) shortage of skilled workers [12]. At the top of their "wish list" is a good work-life balance which means that they expect their employer to provide them with a life-stage oriented personnel policy. A life-phase oriented personnel policy is at the same time demographically oriented, ensures sustainable employability and the compatibility of private and professional life [14]. Also important in the context of the ideal workplace are flexible working time-models, a fair and equitable remuneration, feedback structures, comprehensive education and training opportunities, chances of advancement, challenging tasks, autonomy [e.g. 18]. Added to this are aspects such as a pleasant working atmosphere, the use of modern ICT, job security, fun at work, the company's reputation, the location and an international environment [17,18]. In the context of discussions on job preferences of Millennials it is important to consider that although the label generation does not mean that this group is homogenous per se. Rather,

existing studies show that there are differentiating attributes within this generation that must be considered [e.g. 18].

2 METHODOLOGICAL FRAMEWORK

In this paper we address the demands of Millennials on their (future) job. For this purpose a mixed-method approach including qualitative and quantitative methods was developed (see figure 1).

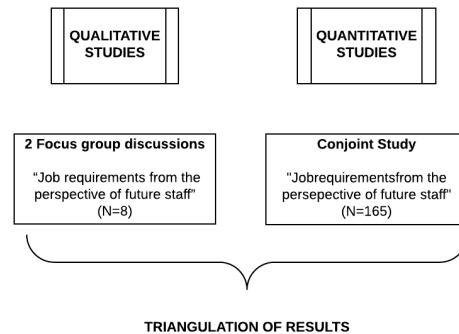


Figure 1 - Overview implemented studies.

As qualitative measures two focus group discussions were conducted (section 3). For quantitative analysis a conjoint analyses (CA) has been set up (section 4). Following the results of both studies are presented separately. A triangulation of findings is presented at the end of the paper and is transferred into a fundamental discussion of the results .

3 IDENTIFICATION OF JOB REQUIREMENTS

A qualitative pre-study was carried out to identify critical job requirements of Millennials.

3.1 Method and sample

In total we have run two focus groups, in which five participants, each discussed the relevant job characteristics of future work settings. Participants were asked to record their expectations of a satisfying and fulfilling workplace and the skills they would bring with them in return. The discussion was guided by a number of open questions that addressed job requirements, as e.g., "how important is work-life-balance to you", "how much flexibility at work do you want", "how important are career and development opportunities". We invited both Millennials (young professionals as well as students) with technical and non-technical background. The non-technical group consisted of 5 persons (n=2 males, n=3 females), from the fields of business administration, technical communication, communication science, and political science. The technical group (n=4 men, n=1 women) were from the field of electrical and mechanical engineering.

3.2 Results of the focus group discussion

The results of focus groups are presented according to 8 categories derived from the discussions:

3.2.1 Self-confident Millennials

In general, the occurrence of the Millennials within the focus group can be assessed as self-confident.

They are confident about their future and expect to cope well with future work challenges. At the same time, they have concrete ideas of where they see themselves in the future. They are actively seeking for their dream job, being rather unwilling to make compromises. The respondents characterize this as a typical attitude of their generation:

"[...] *"But what I can well imagine is that our generation really pays a lot of attention that it is right from the start that it suits us and that we don't take any job that doesn't really correspond to what we imagine, but (maybe) has the only advantage that you make a lot of money there"*.

That is why it is important for them to be *"their own personnel manager"* and to look for a job that suits them and where *"the chemistry is right"*.

3.2.2 Teamwork

Participants report that a familiar and social work environment and cooperativeness is essential for a good work. Only few wished to clearly separate "work friends" from private friends. However, the majority of respondents can well imagine that the private sector and working life are merging together. They envision to be more successful and happier if the center of life is transferred to work, with friends at work, after all a large part of the week is spent at work.

Participants with a technical background specifically wish flat hierarchies with a clear regulation of responsibilities and competencies within the team.

"[...] *but when it comes to the technical, it was clear that there is one person who sets the tone"*.

According to participants, there should be different competencies, so anybody in the team can rely on persons with a specific role and responsibility. Each member should have a unique competence, so every team member is important for the group.

3.2.3 Working atmosphere

From the point of view of the interviewed personas, the working atmosphere includes both social and environmental factors: In the context of social aspects the participants wish respect, trust and freedom on the part of the superiors, a culture that handles mistakes and errors with care, as well as friendly and competent colleagues. In the context of environmental aspects a kitchen for the employees with free coffee and water as well as modern (daylight) offices are expected. In addition, a good and modern technical equipment, office furniture, short waiting times for orders as well as laboratory facilities for withdrawal and tinkering is particularly important for people with a technical background. In the non-technical group, a specific value is placed on the possibility for occasional meetings, e.g. lunch, communication, and exchange.

3.2.4 Job description

"Ideal" tasks were described with attributes like interesting, challenging, diversified, and demanding. Both, the group with technical and non-technical background is looking for tasks in which it can get

involved, with the motivation to learn new things and to be responsible. Respondents are aware that there will also be monotonous, and bothersome tasks,

"[...] *but it is always the question of how this outweighs itself and if the challenge prevails, that is enough"*.

For the participants interesting tasks are also fun and they stress that they want to enjoy doing them. Additionally they report that they are keen to learn new things, as personal development occurs only through interesting and challenging tasks with constant "input". wish to develop personally and professionally, not only to enjoy their work but also to stay attractive for other companies in case of change of employment.

3.2.5 Flexibility

The aspect of flexibility was intensively discussed in both focus groups, but was interpreted differently. Among other things, respondents equate flexibility with freely configurable working hours. Respondents believe that this is the most effective and productive way to work and still get their private lives organized. Flexibility also means being able to come later or leave earlier due to external appointments without posing a problem for supervisors and the company. Also, flexibility also means to be allowed to work from different locations, using mobile communication technology (skype, email, social media) to stay connected with colleagues.

3.2.6 Reconciling work and family

The family-friendliness of a company and the openness of a company towards a balance of leisure and work was also discussed in the context of flexibility in both focus groups. In the non-technical focus group, an understanding for private life and family obligations is explicitly desired. For example, it must not be a problem if a male employee wants to take parental leave. For the females it was perceived as important that they themselves and their partners work in a family-friendly company. The majority of the interviewed stated that they would choose only a company with family-friendly culture, a compatibility of family and career, and a high work-life balance.

3.2.7 Loyalty

In general, opinions were clear: As long as the employer has something to offer and responds to the employees' needs, there is no reason to change jobs. If work gets boring or expectations are not fulfilled, people do not feel obliged to be loyal to the company.

3.2.8 Salary

According to the interviewees, salary plays a comparably minor role:

"[...] *It's one of many aspects. Good pay is always better, but if it's just good pay that makes a job and somehow the job itself is stupid or the colleagues are stupid, then I wouldn't take it anyway."*

3.3 Key findings of focus group discussions

Major outcomes of the qualitative studies revealed that Millennials attach great importance to “soft” factors of work which become as if not more important than salary. A good flexibility at work, interesting and challenging tasks, and the compatibility of career and family are essential job criteria for the upcoming workforce. At the same time, the salary for the Millennials is only one aspect of many when deciding for or against a job. Independently of the professional background is the importance of a good work-life balance and compatibility. For Millennials with a technical background, development opportunities on the job and demanding tasks are key. For Millennials with a non-technical background, the ability and possibility to balance of work and family life.

4 JOB DECISION SIMULATION

Based on the results of the focus groups, the following attributes were identified as important and interesting for the subsequent quantitative decision simulation: (1) *tasks* (levels: routine, easy and challenging tasks), (2) *flexibility* (levels: fixed working times, flexitime, flexible work), (3) *family friendliness* (levels: statutory minimum, co-financing, company kindergarten) and (4) *salary* (300€ less per month, average salary and 300€ more per month). All attributes need to be examined in combination, as in reality such decisions reflect a weighing between and across different levels of job-relevant factors.

4.1 Method

To do so, we used the Conjoint Analysis (CA), a quantitative empirical research method which enables the analysis and simulation of consumers' decisions. In so-called Choice-Based Conjoint (CBC) analysis is used, in which preference judgments in the form of selection decisions are made. Participants were asked to choose the most attractive job offer from a number of alternatives. This comes close to decisions customers have to make in everyday life [19]. By this trade-offs between different attribute levels can be determined and those attributes, which finally influence job decisions most.

4.1.1 Questionnaire design

The questionnaire for the online survey was created using SSI Web Software (Sawtooth Software 2012). The *first part* surveys demographic data (age, gender, level of education, children, current occupation), job-related information and an assignment of the current job (technical vs. non-technical). The *second and the third part* contained two consecutive choice tasks. The first CBC only varied fictive job alternatives out of three attributes – job task types, flexibility at work and family friendliness of the company. In the second CBC salary was added as a fourth attribute to the decision simulation. This was done because we wanted to quantify the relative importance of job characteristics beyond the salary (CBC 1) for the job decision. Then,

in CBC2 salary was added to identified how the decision changes when payments come into play. Each participant finished both choice tasks, with a fixed order (CBC1 before CBC2). At the beginning of the questionnaire a scenario was presented to envision the interviewees that they are in the application phase after finishing their studies and should decide on an employer. The job offers differ in the aspects of tasks, flexibility and family friendliness (see Figure 2) – those characteristics which had been identified in the focus groups. Each attribute was varied within different levels













Attributes of CBC 1			
Attribute	Specification		
Tasks	routine Tasks 	easy tasks 	challenging tasks 
Flexibility	fixed working times 	flexitime 	flexible work 
Family friendliness	statutory minimum 	co-financing 	company kindergarten 
Additional attributes of CBC 2			
Salary	less than 300€ 	average salary 	more than 300€ 

Figure 2 - Overview attributes of CBC 1 & 2.

4.2 The sample

Overall, 165 participants took part (41.8% males, 58.2% females). The average age is 24.53 years ranging from 17 to 33 years of age (SD = 3.12). 62.4% of the sample already finished their studies successfully. Most of the participants (63%) reported that they have no children, but 32,1% stated that they want to become parents in the next five years. With respect to job orientation and field of training 52.7% of the participants directed their job searches to the technical sector. Only 2.4% of the respondents reported to have no work experience at all, while 98% had at least some job experience (internships, training, student assistance activities).

4.3 Results

This section depicts the findings regarding relative importance and part worth utilities on the job choice.

4.3.1 Relative importance of attributes

In order to identify the main factors influencing the choice of workplace, the significance of the four attributes is examined with the help of the HB analysis. Figure 3 shows the relative importance of the attributes. For the CBC 1 it is clear that the nature of job tasks have the highest importance in the scenario presented with 44.04%, followed by the *flexibility* (30.95%) and the *family friendliness* of the company (25.01%). In line with recent research, the most important job characteristic for Millennials is the type of work tasks. The extent of company's family friendliness has the lowest influence on the choice of job, with flexibility ranks in between. When the salary is added as a supplementary job characteristics

(CBC2), things change. From Figure 3, it can be seen that salary now becomes most important (39.16%). Still, the relevance and order of the other job characteristics remain.

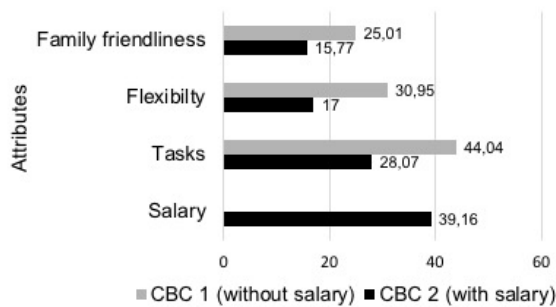


Figure 3 - Relative Importance of attributes.

In second place are the *tasks* (28.07%), followed by *flexibility* (17%) and *family friendliness* (15.77%).

4.3.2 Part worth utility analysis

Now, part worth utilities are analyzed, i.e. the relative impact of the single levels within each attribute. Figure 4 shows the average part utility values (zero-centered differences) of the two CBC analyses across all attributes. Note, that the utility scores can be summed to zero within each attribute. This scaling makes it possible to compare differences between attribute values. High positive utility values contribute to the scenario selection, while negative scores contribute to the choice of an alternative.

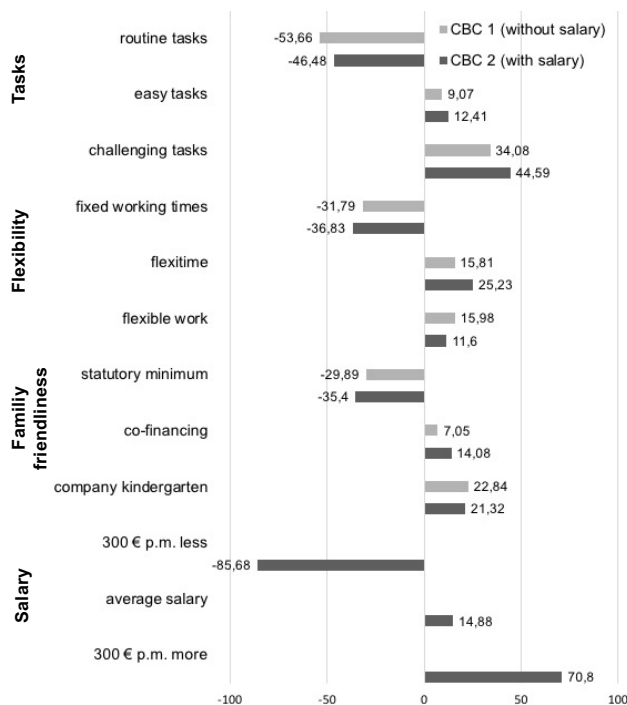


Figure 4 - Part worth utilities.

Independently of salary as a criterion carrying weight, challenging *tasks* are most attractive (34/44), while routine tasks, in contrast, receive clear negative scores (-53/-46), with easy tasks reaching at least slightly positive scores. With respect to *flexibility*,

fixed working times are homogeneously assessed as negative (-31/-36), again, independently of the prevailing salary levels. Flexitime (15/25) and flexible work (16/11.6), in contrast, receive both positive scores. Interestingly, the flexitime is seen still more positive compared to completely flexible work, even though the latter has more leeway. When it comes to the company's *family friendliness*, the "no GO" is the statutory minimum (-29%/-35%), independently of how much money people earn. Whenever the company co-finances family issues, this leads to positive scores (7%/14%). But the highest support was found when a company kindergarten is available (22.8/21.3). Finally, the attribute *salary*, naturally, earning 300 € per month is most attractive (70.8). But an average salary is still accepted (14.88), whereas a salary of 300 € less than the average is already clearly rejected (-85.68). Thus, concluding, the introduction of salary in participants decision modelling shows clear effects: Salary becomes most important criterion, but the order of the assessment of the other attributes stay the same, with the highest importance on work content (task type) and the lowest on family friendliness.

5 FINAL CONCLUSION

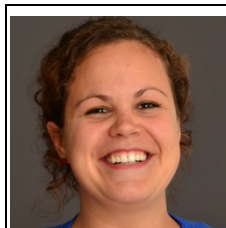
In the context of this work, the choice of an employer and the standards for job choices Millennials apply was examined in this paper. Against the background of a fundamental change in social values and the digitalization of the world of work, the job decisions were explored, in line with major key job criterions – work content and tasks, organizational flexibility, family friendliness, and salary. **The majority of Millennials indeed prefer work tasks that are challenging and responsible, and reject routine tasks. Also the working flexibility is a decisive feature of future employees, thus the possibility of flexitime or even completely flexible work times should be offered.** When it comes to the importance of family friendliness, the respondents – even though they attach great importance to family friendliness when directly asked (focus group discussion), rank this job feature "only" on position three. Whenever salary comes into play and serves as further job decision feature, the old picture of earlier generations come back: Salary is the most important decision criterion for or against a job.

Overall, the study shows that choosing a job is a complex decision-making process, especially for Millennials, who are starting their career with great expectations. The insights of and about Millennials might help to adjust company's attractiveness for "old-school" employers which might be not yet sufficiently warned or informed about the high job expectations of a generation which has the choice.

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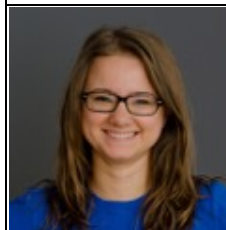
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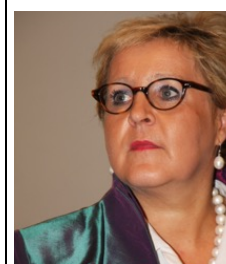
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