THE EFFECTS OF SOCIO-DEMOGRAPHIC AND PSYCHOLOGICAL CHARACTERISTICS ON EMPLOYEE INCOME

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Abstract:
The purpose of this research work is to study the effects of socio-demographic and psychological characteristics on employee income. For this, the author achieved an inquiry on 107 respondents employed by a branch of a private company specialized in public survey from January 7 to February 20, 2008. Using statistical software R and SPSS and applying Linear Mixed-Effects Models the results showed that characteristics like age, seniority, extraversion and agreeableness have a significant effect on employee income.

Keywords: employee, income, Linear Mixed-Effects Models, psychological characteristics, socio-demographical characteristics, survey interviewer

1. Introduction

The achievement of activities within a company/organization involves the using of several types of resources. One of the most important categories is the human resource. This is a critical resource for at least two reasons: on the one hand, employee behavior can be unpredictable and, on the other hand, they ensure efficiency or inefficiency in the fulfillment of their tasks. Therefore, a special attention must be awarded to the employment of persons with suitable characteristics for each post and their remuneration. Those characteristics may be physical (facial expression, tone of voice, clothing style), socio-demographical (sex, age, race/ethnicity, studies, experience) and psychological (conscientiousness, extraversion, agreeableness, emotional stability).

In literature (Adelmann, 1987; Hene man and Cohen, 1988; McMullin and Ballantyne, 1995; Nyhus and Pons, 2005; Avdibegović, Hasanović et al, 2011) it is a growing interest on exploring the relationships that exist between characteristics of employees and their income among both researchers and practitioners.

The purpose of this paper is to enhance our understanding of the effects that socio-demographical and psychological characteristics of employees can have on their income, with the help of Linear Mixed-Effects Models. Generally, Linear Mixed-Effects Models are used to describe relationships between a response variable and some covariates in the data that are grouped according to one or more classification factors (Pinheiro and Bates, 2000).

2. Objective and research methodology

2.1 Objective

The objective of this research work is to study the effects of socio-demographic and psychological characteristics on employee income.

2.2 Research methodology

In order to achieve our objective, we use the case of the survey interviewers working for the Iasi branch of a private company that conducted

public surveys. The necessary information on the employees that were working as survey interviewers has been provided by the Human Resources Department of the company, from 7th January to 20th February 2008. We found out that, the staff of the Survey Interviewers Department is made of 107 young people (62.6%), of which 44.9 % are students, 88.8% are female, 46.7% have 0.5-1 year of seniority and that the personnel turn-over is high (60%). Also, we had access on information regarding survey interviewer evaluation and remuneration.

Because in our research we needed to identify and measure the psychological characteristics of survey interviewers, we did this by constructing a personality test. To do this, firs were identified the psychological characteristics of this category of employee. Many researchers (Moser, 1967; Stoetzel and Girard, 1975; Carton and Loosveldt 1998) sustain that a survey interviewer must be friendly, honest, calm, conscientious, independent, responsible and sociable.

But the individuals are different and an employee may have a large number of characteristics. For this reason, we established a smaller number of features to represent the basic dimensions of survey interviewer personality. According to researchers in the field of psychology (McCrae and OP, 1992) the best representation of a person's features is obtained using a model such as the Big Five. Taking the example of the Big Five model, personality characteristics of a survey interviewer can be determined by four dimensions: conscientiousness, extraversion, agreeableness and emotional stability.

Based on the four dimensions identified in literature, it was observed that each of them can be associated with more features (Morgerson et al, 2005) (Table 1).

Table 1

Operationalization of dimensions

Dimensions	Features
CONSCIENTIOUS:	fair, serious, disciplined, rigorous, thoroughly
EXTROVERTED:	determined, talkative, sociable, active, open
AGREEABLE:	pleasant, generous, friendly, sympathetic, operational
EMOTIONAL STABILITY:	tendency to manage the stress, control, calm, tolerant, self-confidence

Each feature can be expressed through a rated item with a statement (Carter, 2004) (Table 2). Responses to claims were evaluated using ordinal scales coded from 1 to 6 (1-NEVER agree, 2–RARELY agree, 3-SOMETIMES agree, 4–agree, 5-OFTEN agree, 6-ALWAYS agree). These statements were included in a questionnaire. This questionnaire had 20 statements and questions regarding socio-demographical characteristics (sex (1-Male, 2-Female), age (1-less than 20 years, 2-20-24 years, 3-25-30 years, 4-more than 30 years), studies (1- secondary school, 2-high school with no degree, 3- high school with degree, 4-university (in progress), 5-Bachelors Degree, 6-graduate (in progress), 7-graduate (with diploma)) and seniority (1-less than 6 months, 2-6 months-1 year, 3-1-1.5 years, 4-1,5-2 years, 5-more than 2 years) of employee.

Table 2

List of psychological characteristics with defining variables

Dimensions (latent variables)	Statements	
CONSCIENTIOUS	Item 1	Hard work is a way to achieve a goal.
	Item 2	I finish the work started.
	Item 3	I tended to address situations step by step.
	Item 4	If I promise something I keep my promise whatever is the effort requested.
	Item 5	When I do a work I focus my attention only on that thing.
EXTROVERTED	Item 6	I am a joyful person.
	Item 7	I establish easily contact with strangers.
	Item 8	I am sociable and receptive.
	Item 9	I am energetic and active.
	Item 10	I am able to decide quickly and without hesitation.
AGREEABLE	Item 11	Usually I am friendly with others.
	Item 12	I consider myself an easygoing person.
	Item 13	I try to take into account the opinions of others when I make decisions.
	Item 14	When I am in a group, I try to create a pleasant atmosphere.
	Item 15	I laugh and I smile as much as most people.
EMOTIONAL STABILITY	Item 16	I require realistic standards in everything I do.
	Item 17	I seek the consent of those persons who are important to me.
	Item 18	I trust my own abilities.
	Item 19	I stay calm in a complex situation.
	Item 20	I am determined and with spirit of initiative.

In order to do an assessment of questionnaire value, it was applied to the employees of Survey Interviewers Department (n=107).

2.2.1 Checking questionnaire validity

With the data obtained after we applied the questionnaire in Survey Interviewers Department, it was created a database. The data were organized, processed and verified. Their analysis was made using Descriptive Analysis and Factor Analysis.

Descriptive Analysis was made in order to test the normality of distribution of responses for each statement**.** This helped us to identify consistencies in the way in which the respondents answered to various statements and to do a first identification of items that should be eliminated. We observed that for Item 11 and Item 20 the distribution curve is oriented underline to the right or left. It was also noted that for those items we obtained values of mean and standard error too large or too small.

Factor Analysis was applied to study the relations between items. The results obtained showed that the outcome factor indicates a grouping of items on 4 main components which explains about 60% of the total variance (Table3).

Table 3

Total variance explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,845	26,917	26,917	3,532	19,620	19,620
2	2,493	13,853	40,770	2,795	15,527	35,147
3	1,731	9,617	50,387	2,261	12,559	47,706
4	1,711	9,508	59,895	2,194	12,189	59,895

Extraction Method: Principal Component Analysis.

The grouping of analyzed items is presented in Table 4 and Figure 1.

Table 4

Grouping items

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Item5	,779			
Item6	,723			
Item15	,720			
Item11	,678			
Item7				
Item13		,810		
Item14		,776		
Item12		,653		
Item4		,542		
Item2				
Item9			,830	
Item17			,778	
Item8	,508		,612	
Item3				,739
Item16				,717
Item1				-,616
Item18				,540
Item10				

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 22 iterations.

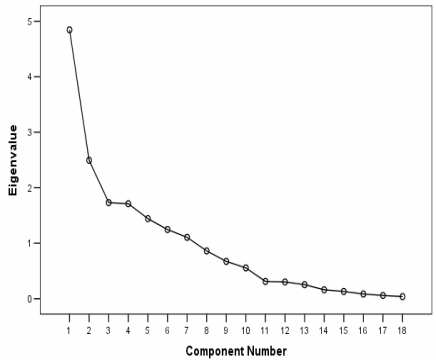

Figure 1. Scree Plot

From the results obtained in Table 4 we observe that component 1 is composed by 5 items, component 2 include 4 items, component *3* include 3 items end component 4 is formed by 4 items. From Figure 1 we see that the items that are on steep slopes can be stored.

Table 5 and Figure 2 show correlation coefficients of items with factorial axes.

Table 5

Correlation coefficients of items with factorial axes

Component Score Coefficient Matrix

	Component			
	1	2	3	4
Item2	,152	-,243	,158	,096
Item3	,179	,017	-,121	,365
Item4	,071	,162	,011	,041
Item5	,289	-,217	,000	,034
Item6	,219	-,011	-,074	-,070
Item7	,097	,062	,042	-,030
Item8	,068	,068	,224	,043
Item9	,001	-,011	,374	,073
Item10	,046	-,035	-,011	,160
Item11	,176	-,014	,072	-,003
Item12	-,074	,216	,174	,066
Item13	-,068	,330	-,065	,015
Item14	-,050	,327	-,083	-,186
Item15	,256	,035	-,194	,078
Item16	-,047	,066	,018	,313
Item17	-,158	-,073	,426	-,131
Item1	,083	,042	-,063	-,270
Item18	-,073	-,062	,094	,241

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

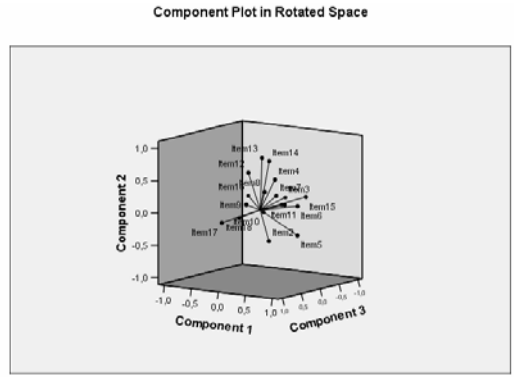

Figure 2. Correlation coefficients of items with factorial axes

From the results obtained in Table 7 end Figure 2 we see that, the first component is representative of items which include extroverted people, the second component includes agreeable people, the third component is representative of those conscientious and last component includes people emotionally stable.

Considering the results of Descriptive Analysis and Factor Analysis, we noticed that can be identified and other items that should be

eliminated. Those items are: Item 10, Item 17 end Item 19.

After the removal of those items we verified the internal consistency of the questionnaire using Alpha Cronbach Coefficient. The value of Alpha Cronbach Coefficient obtained for the entire questionnaire is 0.822. This result indicates that the questionnaire is stable.

The final score obtained by each respondent was calculated as an average by summing the items that make up each dimension and dividing this sum by their number.

3. Results

3.1Effects of socio-demographic and psychological characteristics on employee income

In order to study the effects of socio-demographic and psychological characteristics on employee income we use Linear Mixed-Effects Models. In literature (Laird and Ware, 1982; Pinheiro and Douglas, 2000) Linear Mixed-Effects Models may be expressed in different but equivalent forms. In our case, we expressed such model in hierarchical form:

$$y_{ij} = \beta_1 x_{1ij} + \cdots + \beta_p x_{pij} + b_{i1} z_{1ij} + \cdots + b_{iq} z_{qij} + \varepsilon_{ij} \quad (1)$$

$$b_{ik} \sim N(0, \psi_k^2),\ Cov(b_k, b_{k'}) = \psi_{kk'}$$

$$\varepsilon_{ij} \sim N(0, \sigma^2 \lambda_{ijj}),\ Cov(\varepsilon_{ij}, \varepsilon_{ij'}) = \sigma^2 \lambda_{ijj'}$$

where:

- y_{ij} is the value of the response variable for the *j*th of n_i observations in the *i*th of M groups or clusters.
- $\beta_1, \ldots, \beta_p$ are the fixed-effect coefficients, which are identical for all groups.
- $x_{1ij}, \ldots, x_{pij}$ are the fixed-effect regressors for observation *j* in group *i*.
- $b_{i1}, \ldots, b_{iq}$ are the random-effect coefficients for group *i*, assumed to be multivariately normally distributed.
- $z_{1ij}, \ldots, z_{qij}$ are the random-effect regressors.
- ψ_k^2 are the variances and $\psi_{kk'}$ the covariances among the random effects, assumed to be constant across groups.
- ε_{ij} is the error for observation *j* in group *i*.
- $\sigma^2 \lambda_{ijj'}$ are the covariances between errors in group *i*.

The results regarding the estimated model are presented in Table 6.

Table 6

Details regarding the first estimated model

Model	Coeficcients	Std. error	t-value	p-value
(Intercept)	765.5721	67.65997	11.314993	0.0000
Age	-35.0841	15.63724	-2.243622	0.0271
Studies	-6.2034	8.10636	-0.765256	0.4460
Seniority	91.5387	10.22256	8.954569	0.0000
Sex	-6.7976	27.68971	-0.245491	0.8066
Conscientious	-15.8554	15.30933	-1.035672	0.3029
Extroverted	-29.4663	12.19419	-2.416423	0.0175
Agreeable	29.2692	11.80219	2.479978	0.0148
Emotional_stability	16.2389	11.73440	1.383872	0.1695
AIC	1197.738			
BIC	1226.173			
logLik	-587.869			

From the results obtained in Table 6 we observed that, the probability value is greater than 0.05 for variables like "Studies", "Sex", "Conscientious" and "Emotional_stability". Those variables were removed from the estimated model. The results are presented in Table 7.

Table 7

Details regarding the second estimated model

Model	Coeficcients	Std. error	t-value	p-value
(Intercept)	755.4069	50.76510	14.880438	0.0000
Age	-34.6373	13.61320	-2.544391	0.0124
Seniority	88.3604	9.68310	9.125217	0.0000
Extroverted	-26.4589	10.60827	-2.494172	0.0142
Agreeable	26.2516	11.42788	2.297154	0.0237
AIC	1221.652			
BIC	1240.027			
logLik	-603.825			

For this model we checked if the underlying distributional assumptions appear valid for the data. We did this using methods based on plots of the residuals, the fitted values, and the estimated random effects (Figure 3).

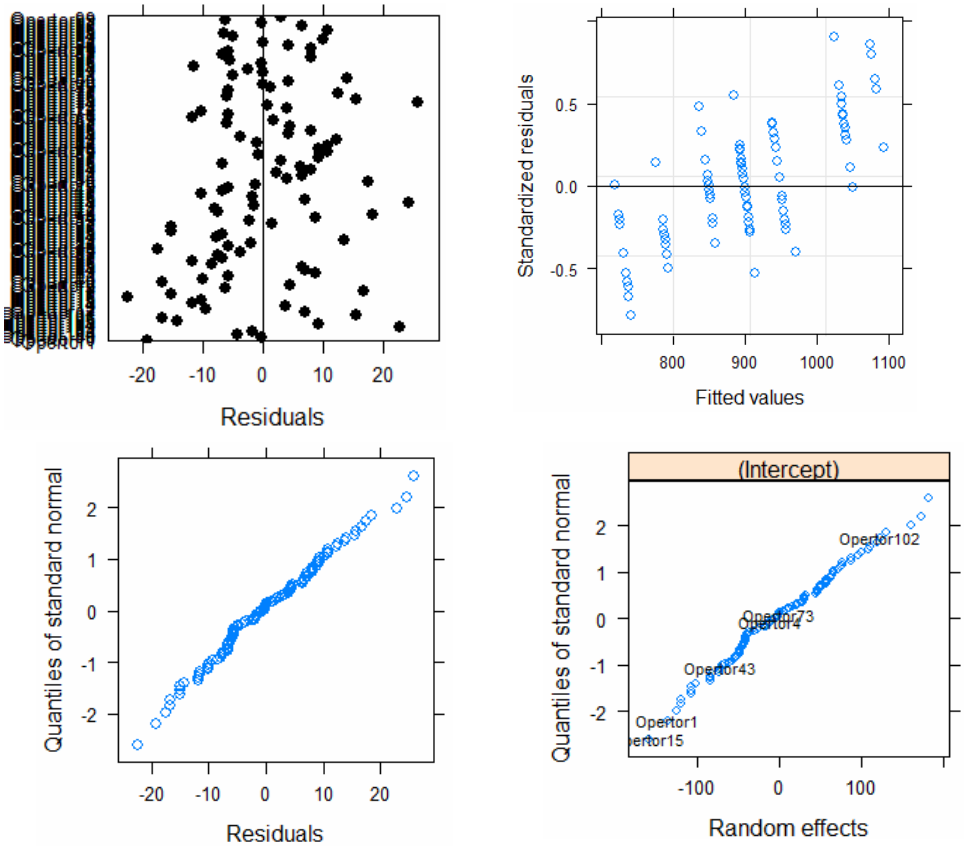

Figure 3. Plots of the residuals, the fitted values and estimated random effects

In the first residual plot presented in Figure 3 are presented the residuals by group. This plot is useful for verifying that the errors are centered at 0 ($E[\varepsilon_{ij}] = 0$), have constant variance across groups ($Var(\varepsilon_{ij}) = \sigma^2$), and are independent of the group levels. The first residual plot indicates that the residuals are centered at zero, but that the variability changes with the group. We can get a better feeling for this pattern by examining the second plot, of the standardized residuals versus fitted values. The second plot of Figure 3 confirms that the within-group variability is increase.

The assumption of normality for the within-group errors can be assessed with the normal probability plot of the residuals produced in the third plot of Figure 3. From this plot we observe that the normality assumption for the within-group errors is plausible.

Through the last graphic of Figure 3 we investigate the marginal normality of the corresponding random effects. This plot do not suggests any departures from the assumption of normality of the random effects distribution.

4. Conclusions

The present paper has examined the effects that socio-demographic and psychological characteristics could have on employee income. To do this we used the case of survey interviewer. The results of the statistical analyses show that characteristics like age, seniority, extraversion and agreeableness have a significant effect on survey interviewer income.

Generally, for an employee those characteristics are very important. His age is correlated with physical qualities and this can inspire self-confidence, maturity, empathy and professionalism. Seniority is a characteristic that can have a major impact on the quality of work and on productivity. On the other hand, using experienced employees implies lower training costs, because in time they get used to the techniques and the instruments. An extroverted employee is sociable, determined, talkative and active. He collaborate easily with others, has self-confidence and positive thinking. An agreeable employee is generous, pleasant, friendly, nice and operational. He can easily resolve conflicts and help their colleagues.

In the case of a survey interviewer, taking into account that his activity implies the performance of more tasks (finding the respondents and getting their cooperation, preparing and motivating the respondents to answer the questions, making questions, offering explanations, recording and verifying incomplete answers), it is not wrong to consider that his income depends on his socio-demographic and psychological characteristics. But, if an employee has the right characteristics to fulfill his tasks successfully does not mean that he will be better paid. He must be motivated (Moro□anu, 2009a) to do his work and to have an appropriate working environment (Moro□anu, 2009b; Moro□anu, 2011). In this case we believe that are and other factors that can influence the employee income.

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