Conditions of The Life Quality – Methodological Remarks

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Abstract: The life quality results from the degree of needs satisfaction, what comes among other from goods and services consumption. The aim of the work is to widespread the outcomes from author's research attempting to find the determinants of the life quality, using more advanced statistical methods. These methods, on the base of individual distributions and at assumption that ordinal scale is treated as a ratio scale, may widen the analyses of sources conditioning the life quality. With various degree of details, there were presented the results of the life quality statistical modelling. Particular emphasis on usefulness of logit regression model and the use of cumulative probability was applied. Statistical data were drawn from realization of three research projects funded by National Science Centre in 2011-2015.

Keywords: life quality, social exclusion, families with disabled children, life quality modelling, life quality determinants

JEL codes: I12; C31, E21, I31

1. Introduction

The satisfaction of human needs take place through consumption process being shaped by, among others, consumers' behaviors. Therefore, the statistical measurement of objective and subjective factors influencing the degree of the needs satisfaction shall be diversified due to necessity of use of measurable and unmeasurable diagnostic features. The unmeasurable features are subjective estimations of needs satisfaction degree. These estimations define, for example, the quality of life. Since the very beginning of own studies, the Author defines the category of life quality as the subjective mental and emotional states conditioned by degree of existence and life needs

satisfaction in relations to given external circumstances (Słaby et al., 2016: 118). Therefore, the life quality is a variable observed in indirect way and its empirical evaluation is usually obtained using Likert scale. Numerous examples of the use of hidden variables (empirically non-observable, e.g. consumer behaviors or human resources) are presented in the article written by S. Kot and T. Słaby (2013). These variables are described using selected by researcher measures. These measures, if related to the life satisfaction, are mostly the life satisfaction and happiness feeling ones.

The problem of the life quality definition is still unsolved, which is widely described by T. Panek (2016: 13-27). The life quality is one of the four categories of social changes which are influenced in great degree by consumption of goods and services. Other three categories are the conditions and level of life being evaluated using objective indicators of primary infrastructural character, and the life dignity – the category more and more often occurring in research on contemporary civilization features – evaluated obviously only in subjective way. As noted by C. Bywalec (2007: 36), the life quality is subjective by its nature, synthesis of wellbeing, consumption, personal satisfaction and happiness. In this situation, the basic research question is "what has decisive influence on high estimation of the life quality". Is it wellbeing mostly being associated with income situation, or goods and services consumption satisfying aspirations, or life satisfaction and feeling the states of happiness not necessarily connected with conditions of objective type. Own research experience of Author (2011-2014) indicates that determinants of the life quality estimations depend on individual's life phase and its family situation. It could mean that the use of diagnostic procedure (definitions, measurement, statistical method of results analyses) principally should be related to given group of respondents. However, there can be distinguished the set of several determinants which are conditioning the life quality with similar force in various social groups.

2. Methodological remarks

The paper presents Author's research findings regarding the life quality determinants, with application of more advanced statistical methods. These methods, at e.g. assumption that ordinal scale will be treated as ratio scale, can extend analyses of the sources conditioning the life quality, obtained at the base of individual distributions. There can be used also such modelling method which is respecting ordinal notation on the Likert scale.

Any analysis of the life quality, independently from adopted definition, encounters the problem of its quantification. The basic statistical problem is a statistical measurement of the life quality. These measurements are usually performed with application of questionnaires containing questions enabling realization of research's aim through individual distributions of answers. Most of studies use ordinal scale, what raise diverging researchers' opinions, if ordinal scale – most commonly the Likert scale, entitles to treat the numbers on that scale as continuous ones. In subject literature, there is no documented opinion that the results obtained from Likert scale can be statistically elaborated using the basic arithmetical operations (Francuz and Mackiewicz, 2005: 390).

Another methodological issue is the choice of statistical method – at least in relation to two-dimensional variable, which allows to distinguish statistically significant variables referred to as determinants (factors) which differentiate the distributions of the life quality measures. First "signals" concerning the factors are obtaining thanks to individual distributions of answers respecting respondent's features. Two-dimensional analysis correlates only two variables, while each phenomenon is differentiated by simultaneous action of several factors. As a "transitional" step between two- and multi-dimensional approach Author has used two-factors analysis of variances in analysis of social exclusion characterizing the quality and dignity of the life of aboriginal village inhabitants aged 60+. This allowed for investigations of interaction between these life categories measures, simultaneously with two variables (Dąbrowska et al., 2016: 146). Due to editorial restrictions, the formal notations in the work were omitted and substituted by references to published works of the Author. Moreover, verification of models' assumptions and estimation of their "goodness" were not performed, due to non-randomness of sample. The only exception related to algorithm notations is logit regression model, due to its rare occurrence in literature and suitability in case of ordinal scale using along with cumulative probability.

In the work, there are presented results of attempts to apply the selected methods of multidimensional statistical analysis in the context of restriction imposed by the ordinal scale applied in the studies of quality of the life with use of subjective variables. Specifically, there are presented four models that respect or omit the use of these scales. Statistical data for all models, for which methods of multidimensional analysis were applied, in order to extract the

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determinants of life quality come from studies carried out in the framework of projects financed by the NCN[1].

3. Modelling of the life quality. Examples no. 1 and no. 2

First satisfactory author's results of the life quality modeling, and obtained determinants of the life quality without rigor designated by ordinal scale, are described in cited above work of S.M. Kot and T. Słaby (2013). In that work was demonstrated that two methods for life quality determinants establishment, provided identical factors conditioning the life quality. These were the orthogonal regression in versions known as „epsilon method", which does not respect ordinal measurement of dependent variable (life satisfaction as the measure of life quality), and the ordinal logistic regression. However, it should be underlined that obtained there results concerned only purposeful sample of 90 persons. These persons were working at managerial posts in Warsaw, earning more than 5000 PLN monthly. Eventually they were paying their bank credits and/or working at managerial posts, as well as persons who could possess succeeded estates. Persons having these features were recognized as representatives of emerging upper class in Poland. The main purpose of cited research was verification of hypothesis concerning the influence of consumer behaviors characteristic for material mercantilism, on being sensed life quality.

4. Epsilon method

Application of the multiple regression model is burden with the assumption of features non-correlation. Epsilon method bypasses this issue. Transformation of explanatory variables set into orthogonal variables allows to use regression coefficients to estimate the share of explained variable in the model determination coefficient. Orthogonalization of primary variables allows for their presentation as a linear combination of independent variables. Thanks to that it is possible to estimate the influence of each independent variable separately or in

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connection (interaction) with others. Epsilon model is of J. Johnson' authorship. The essential idea of this method is based on approximation of relative weights through creation of non-correlated dummy variables reflecting the structure of the distribution and connections between input explaining variables. These new dummy variables will create new predictors for explained variable. Relative weights can be interpreted as the share of independent variables in explanation of dependent variable (Słaby and Młodak, 2010: 95).

5. Results of Epsilon method

To explain the satisfaction with the life, where the life is treated as the whole, and the satisfaction as the measure of the life quality, there were chosen the following independent variables, which characterize satisfaction with: family life; marriage/partnership; own friendships; having children; leisure and rest time; education; possessed material goods; material status; political situation in the country. Consideration was given also to respondent's age, sources of happiness and respondent's sex. The set consisted of the most often encountered potential determinants of the life quality of individual units.

Assuming, that Likert scale, ordinal by its nature, provides results measured on odds ratio scale, the regression model in Epsilon version allowed to state that the biggest influence on the life satisfaction level in the group of investigated representatives of upper class in Poland in 2012 year had have four variables: satisfaction with marriage/partnership, satisfaction with family life, satisfaction with job and sex of respondent. Additionally, the satisfaction with incomes there can be added, as its relative weight inconsiderably differentiates from relative weight for respondent's sex.

6. Ordinal logistic regression

To examine the dependence between the life quality measured by satisfaction with life, where the life is treated as the whole, and mentioned above independent variables, the ordinal logistic regression was used (Cameron and Trivedi, (2005); Long and Freese, (2006); after: Kot and Słaby, 2010: 221). Also in this model, the assumptions were analogic to Epsilon model, i.e. that the satisfaction with life used as a measure of the life quality was an unobservable continuous random variable. In the model of ordinal logistic regression, the ordinal

measurement of these results on the Likert scale was considered, as distinct from Epsilon model where the results were regarded as measurement on odds ratio scale.

7. Results of ordinal logistic regression

In the investigated sample of representatives of upper class in Poland, the evaluation of life satisfaction was limited to three states: „neither satisfied nor dissatisfied", "rather satisfied" and "very satisfied". Preliminary calculations were done to make an optimal choice of independent variables which are both statistically significant and giving the best fitting. Procedure of modeling allowed for statement that sex of respondent, satisfaction with marriage/partnership and satisfaction with job decide about the life satisfaction. Mentioned three determinants occurred in the set of the five most important variables appointed by Epsilon model. Therefore, we can talk about great consistence of results obtained by these two models. It means that in the Epsilon model it was admissible to use ordinal results from Likert scale as if they were measured on odds ratio scale.

Logistic modeling provided also additional determinants of the life quality described in Epsilon model by "the life satisfaction" as a measure. The basic determinant of the life quality of Polish upper class, on the ground of individual distributions, was the possessing of material goods, followed by safety and peace feeling, realization of dreams, and freedom and independence. Respondents admitted that the basic source of happy life (second measure) was the family life, successful marriage/partnership, health and possession of children. The answers for questions about the life quality were most strongly differentiated by sex and income situation as the features of respondents. Analysis performed in the work with use of two different mathematical models revealed the new determinants of the life quality. Obtained results have no features of generality, thus they are not related to each instance.

8. Modeling of the life quality. Example 3

The example 3 presents the results of searching for the life quality determinants related to families with disabled children. The life quality of families with children with limited mental and physical abilities – as the subject of analyses – was included to research task in the contest of inclinations of such families to show activities in the field of microenterprises and

collaborative consumption. An assumption was accepted that stabilized emotional states may increase the inclinations to undertaking such activities and behaviors.

In the new situation, when disabled child appears in the family, and the awareness that this disability will last for long time, the life quality will have an influence on the change of the life conditions and will permanently determine the degree of needs fulfilment. In such instances, the economic situation mostly gets worse, structure of consumption expenses is changing, and family's relations, as well as environmental and social ones becomes radically different. These are strong stress-including factors having an influence on subjective estimation of the life. The life quality of such families' members depends on adopted attitude to such situation.

Therefore, there are new different determinants diversifying the life quality of families with disabled children. In the set of the life quality determinants occurred a degree of child's disability, progression and type of disease, current effects of rehabilitation, ability to "break away" from environmental isolation - such isolation many times is built by environmental personal reactions (prejudices), lack of suitable infrastructure, unfavorable legal regulations and system of social aid funding.

The life quality of persons who are parents or fosterers of disabled children aged under 18 was subjected to empirical research of quantitative character. In comprehensive Author's questionnaire, there were included eight questions. Respondent answered the questions posed by pollsters who marked the chosen answer on ordinal scale. Research sample consisted of 686 respondents from the whole Poland. In the investigated group of respondents prevailed women. In the first step of results analysis, the dependence of the life quality estimations, where these estimations were done using two measures, namely – the life satisfaction and happiness in family – was examined through prism of sex, because it was assumed that utterances of women can be more emotional. Levels individual distributions of these two measures of the life quality of these families are presented on illustrations 1 and 2. One can notice that two variants of answers, namely "rarely" and "often" occurred both among women and men, and that their frequencies were very close to each other. Also, the variant "very often" was chosen relatively often in studied sample, both by women and men. Therefore, according to individual distributions, the sex of respondents was not a factor strongly differentiating the evaluations of the life quality.

Figure 1. Graphic illustration of variants frequency in answers for question about the life quality (according to sex)
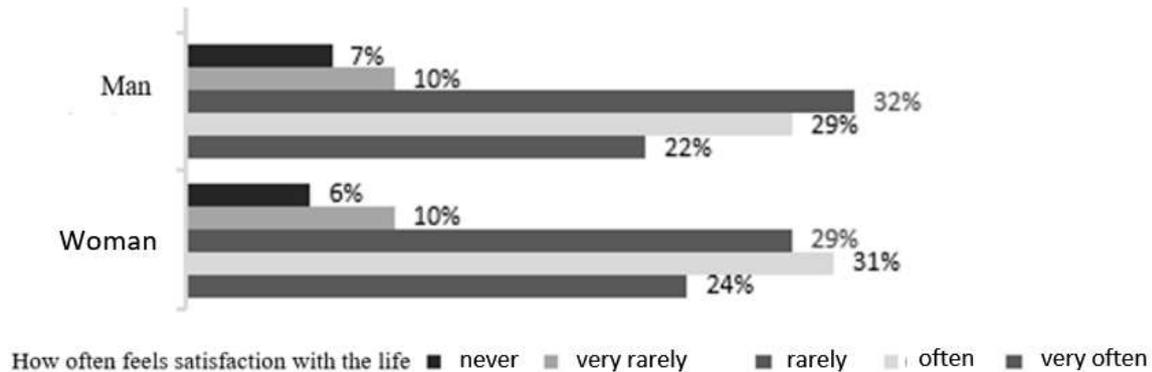
Figure 2. Graphic illustration of variants frequency in answers for question about happiness in the family (according to sex)
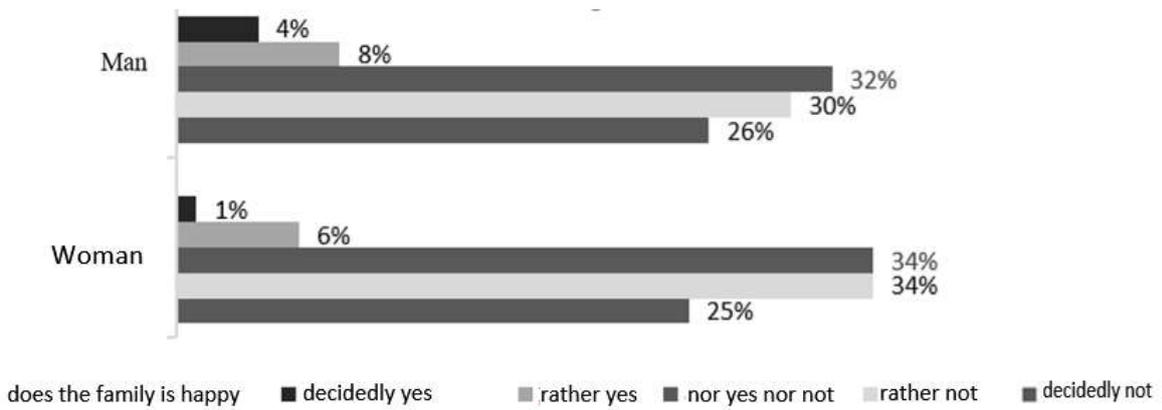
9. Model of ordinal logistic regression with cumulative probability

The aim of modeling was to find the answers of respondents participating in quantitative research for question about which features and opinions may determine the estimation of the life satisfaction and happiness in families with disabled child/children.

Both mentioned measures of the life quality appear on ordinal scale with 5 variants. In the case of the life quality, these variants were as follows: 0 – never; 1 – very rarely; 2 – rarely; 3 – often; 4 –

very often, and in the case of estimations of happiness in family: 1 – decidedly no; 2 – no; 3 – neither yes nor no, 4 – yes; 5 – decidedly yes.

The hypothesis was posed stating that the chosen features of respondent are conditioning with various strength the chances for transition from the situation where the respondent is rarely feeling the satisfaction with life to the state of often feeling this satisfaction. The same assumption concerned the chances of transition from the state where the respondent decidedly was not feeling any happiness to the state of positive estimation of the happiness in the family with disabled child/children. The dependent variables in this model were two above mentioned measures.

The independent variables in both models were:

–   Type of child's disability, marked as (R_disabl) (five variants, as the reference was "physical disability"),

–   Own room possessed by child, marked as (Own_room). (two variants, as the reference was "not possessing",

–   Child's average time of staying out of home, e.g. staying in kindergarten or school, marked in the scale as 4-8 hours and over 8 hours (3 variants, as a reference was „less than 4 hours"),

–   Who takes care over child, marked as: one parent or legal fosterer (3 variants, as reference was „full family – two parents"),

–   Reconciliation to fate, marked as „Reconciled". (two variants: yes, no; as reference was „no"),

–   Professional work of mother, marked as "Mother_work", (two variants: yes, no; as reference was" doesn't work"),

–   Estimation of financial state, marked as "Fin_Syt_Est" (two variants: good, bad; as reference was „bad situation").

In the case of variables being measured on ordinal scale, the solution is the modeling of logit regression, on the base of cumulative probability concept (A. Agresti, 2009: 599). Thanks to that approach, operations on scale numbers are not performed, and instead of several models (for each variant of answers) it is possible to estimate one multivariable logit model. For the description of algorithm of logistic regression model on the base of cumulative probability it is assumed that:

–   X is an ordinal explanatory variable with c variants;

– $P(X \leq j)$ is a cumulative probability that X will have variant not higher than j (j=1,2,..j-1), what can be written as:

$$P(X \leq j) = P(X=1) + P(X=2) + \cdots + P(X=j), \qquad (1)$$

thus, e.g. $P (\leq 5) = 1^2$.

In models concerning answers marked on ordinal scale, the cumulative probability (1) is used, and there are obtained the odds ratios $\dfrac{P(Y \leq j)}{P(Y(> j)}$ of choice of answer's variant j or previous to j. In the case of the last variant, the cumulative probability equals 1 (one) and is excluded from model.

Model describing influence of explanatory variables X on all cumulative probabilities *c-1* for Y has a form:

$$\text{logit } [P(Y \leq j)] = \alpha_j + \beta X, \quad j=1,2,3\ldots,c-1. \qquad (2)$$

For example if number of categories is c = 5, this single model describes four dependances: influence of X on chances for Y≤1 against Y>1, influence of X on chances for Y≤2 against Y>2, etc. Parameters of free terms (intercepts) αj are not interpreted, and parameters β describe influence of explanatory variables on the choice of answer variants for explaining variable X. Interrelation between X and Y can be interpreted using expression $\exp^b$.

10. Results of modeling.

Regarding non-randomness of the sample, below are presented only evaluations of model's (2) parameters together with signalization of only model's goodness evaluations. Structured model has no prognostic character and all generalizations may have merely approximate character, because the results are related only to given sample.

Estimations of parameters of logit regression ordinal model with cumulative probability are presented in table 1.

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[2] With five variants of dependent variable as adopted in presented analysis.

Table 1. Estimation of parameters of logit regression ordinal model for dependent variable „Satisfaction with life" *

Variables	Value of parametr b	Standard error S(b)	Wald chi-squared statistic	p – value	exp[b]
Intercept					
Satisfaction 1	1,653	0,4495	13,526	0,000	5,223
Satisfaction 2	2,804	0,4463	39,486	0,000	16,514
Satisfaction 3	4,834	0,4698	105,847	0,000	125,688
Satisfaction 4	6,654	0,5018	175,848	0,000	776,074
R_dissabled.2	–0,366	0,2396	2,335	0,127	0,693
R_dissabled.3	–0,356	0,1897	3,529	0,060	0,700
R_dissabled.4	0,388	0,3102	1,564	0,211	1,474
R_dissabled.5	–0,101	0,2635	0,147	0,701	0,904
Own room.	–0,045	0,1656	0,073	0,786	0,956
Child not in house 4-8 hours.	0,410	0,1587	6,661	0,010	1,506
Over 8 hours.	0,571	0,3056	3,492	0,062	1,770
1 parent	–0,511	0,1762	8,406	0,004	0,600
Legal fosterer	–0,685	0,5191	1,740	0,187	0,504
Reconciled	1,160	0,0925	157,367	0,000	3,190
Mother_work	0,082	0,0356	5,295	0,021	1,085
Fin_syt_est.	0,214	0,0741	8,364	0,004	1,239

* Collective test (estimates significance of cumulative influence of all independent variables): reliability to chi-square ratio = 286,355; df =12; p – value = 0,000. For given sample with p< 0,10 the influence is significant.

Source: own elaboration on the base of empirical results obtained during realization of NCN grant no 2013/09/B/HS4/01965, with use if IBM SPSS, version 23.

On the ground of the data presented in table 1, specifically on the data related to the level of test probability „p-value" and comparison of numerical values to acceptable significance level $\alpha \leq 0,10$, one should note that the type of disability – namely, intellectual one – has statistically significant influence on the choice of answer's variant for question about the life satisfaction. As the next significant influences, there should be noted: the period of time longer than 4 hours

in which the child is out of the home, as well as only one parent's care, reconcilement with situation after disabled child was born, professional work of mother and evaluation of financial situation. Further interpretation related to mentioned statistically significant estimations of parameters is carried out using values of exp^b. Therefore:

- The respondent from the family with intellectually disabled child, if compared to the family with physically disabled child (reference variant), has odds ratio of satisfaction feeling lower by 30% than such a ratio in situation considered as not reference one. It simultaneously means a lesser probability of satisfaction feeling, if compared to family with physically disabled child;

- Thanks to child's staying out of place of living for approximately 4-8 hours – if related to 4 hours – the odds ratio is greater by 50,6%, and in the case when staying out of home is longer than 8 hours, this ratio is greater by 77%, what means bigger probability of the life satisfaction feeling;

- In the state of satisfaction in situation when one parent takes care about child, if related to the care performed by two parents, the odds ratio is lesser by 40%, and in the case of fosterer it is lesser by 50%, thus the probability of life satisfaction feeling is lesser;

- Persons reconciled with the situation with disabled child in family have the mentioned odds ratio greater by 219% if compared to persons not reconciled with the situation;

- The family with working professionally mother has the odds ratio greater by 8.5% if compared to the situation in which it is necessary to abandon the work. Thus, the probability of the life satisfaction feeling is bigger;

- When the respondent is expecting an improvement in the financial situation, if compared to opposite situation, the odds ratio of the life satisfaction is greater by 23,9%.

Considering the answer for the question about happiness of family, estimations of parameters allowed to note that the same explanatory variables (except the type of child's disability) had statistically significant influence on opinion about happiness in the family.

11. The life quality determinants on the base of qualitative research

The life quality is always a resultant of many factors. As it is a sensitive image of mental and emotional states, the respondents are more "open" in answers for questions given in qualitative studies. These studies were carried out in two stages: stage A consisted of three group investigations (FGI) conducted among parents of disabled children and employees from aid institutions, while stage B consisted of twenty deepened individual investigations conducted among parents with disabled children (IDI). These investigations were performed in IVth quarter of 2014 year.

On the base of statements of parents and fosters of disabled children, who participated in the research concerning various type of determinants, there was found that into the factors lowering the life quality of the families can be included listed below issues:

1) lack of regulations guarantying the aid from the side of medical or social services, which could be payable or not, and destined for intermission or gaining a free time for regeneration of forces. Lack of own leisure time was the most often mentioned „trouble" connected with the care over disabled child, thus being the strongest negatively acting factor influencing the life quality;

2) lack of support for parents with disabled child/children, from the side of physicians and specialists, psychologists, supporting system aimed to socialization of the child and its integration in environment; lack of informational support concerning new regulations; lack of current information on websites of aid organizations. According to respondents participating in qualitative research, the aid system is constructed as to be a "turbid water" system;

3) difficult relations with parents of healthy children in the situation of joined education in the school. The contacts with parents of healthy children are limited. Parents of healthy children make a distance, they are not teaching their children empathy nor toleration, they attribute disabled children to the hyper-excitability and the guilt for conflicts in groups and lower education level in integrational classes. Due to lack of suitable information, important role play contacts with other parents of disabled children, who are supporting each other and fulfill various positive needs. It has decidedly the greatest importance for an occurrence of positive emotional states conditioning the life quality. "External" difficulties hamper the thoughts of such families regarding their own initiatives in the field

of microenterprises. The analysis of answers for the questions concerning the research subject scope is difficult and requires the studies within more homogenous groups of respondents (considering all types of disability, years and effects of rehabilitation, changes in family's situation caused by births of disabled children and care over them). Confrontation of results of the qualitative and quantitative studies makes a conviction that it is necessary to preform both kinds of studies to distinguish the determinants, which are differentiating the global estimation of the life quality in investigated social group.

12. Modeling of the life quality. Example 4

Next, the forth example of the use of statistical methods from the range of multidimensional analyses, was based on the results of social exclusion studies viewed through the prism of the life quality and dignity of persons aged over 60 – aboriginal inhabitants of villages in so called Poland „B". The search for determinants was carried out on the ground of analysis of two-dimensional features distribution, analysis of the force of features dependence and two-factor analysis of variances.

In relation to correlation analysis, the type of measuring scale was not an obstacle, as the calculations of measures were based on frequencies of two-dimensional features in the distributions, while in the analysis of variances – similarly to Epsilon method application – the restrictions concerning treating the numbers on the scale as the continuous ones were omitted. It was dictated by the chance for obtaining the interactions of presumable determinants of the life quality of the representatives of the investigated social group.

13. Methodology of research

Quantitative and qualitative studies performed by Agency of Marketing Studies in 2014 year, were complimented with the use of so called visual sociology[3]. This research tool is a valuable supplement for diagnosis basing on information gathered during the investigations. Empirical

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[3] The research directed by T. Słaby was realized for the needs of project „Social exclusion – the quality and dignity of the life of persons aged 60+ - „aboriginal" inhabitants of villages in Poland, which was funded with NCN (National Science Center) means. It was realized in Collegium of Management and Finance, SGH, in 2014-2016.

research was carried out in four voivodeships in so called Poland "B": Warmińsko-Mazurskie, Podlaskie, Lubelskie and Świętokrzyskie. According to classical, related to voivodeships approach for regional analyses, performed by Central Bureau for Statistic (GUS), in these voivodeships was noted the highest degree/range of poverty.

In the I stage, the quantitative research within selected purposive-quota sample of 400 respondents (100 in each voivodeship) was conducted. The unit of observation was a person aged 60+, born and living in the village that is an aboriginal inhabitant. Selection of respondents for quantitative research was indicated by workers of welfare centers, representatives of parish centers, village majors, and neighbors as well, thus the sample was of a purposive character. Author's questionnaire consisted of 62 questions. The pollster conducted the investigation using PAPI technique.

In the II stage, the qualitative research with participation of 24 persons from Lublin, Olsztyn, Białystok and Kielce was conducted. The respondents represented local authorities, majors of villages groups, aid and nongovernmental organizations, parish centers, and Caritas. Interlocutors were the persons well knowing socio-economic situation of the region, both at the level of voivodeship and unitary one (familiar with families, persons in needs or/and persons exercising the support from aid institutions.

In the quantitative research participated about 10% more women than men. Such proportion according to the sex was related to subpopulation in each voivodeship. Among four age groups the most numerous (33%) was the group of younger seniors (60-65 years old), both in general and in the section of four voivodeships. The percentage of respondents from remaining three age groups was approximately the same (17% to 22%). Relatively large group was constituted by decidedly older respondents, aged over 80 years, what was not often encountered in so far conducted research on the life quality of persons aged 60+.

The life quality was characterized using two determinants: satisfaction with life and happiness feeling resulting from respondent's family happiness. In general, 85% of respondents answered positively on the question about the life satisfaction. The largest number of satisfied with current life respondents was found in Lubelskie voivodeship (97%), and the smallest group was in Warmińsko-Mazurskie voivodeship (83%). The most often encountered source of dissatisfaction was lack of health (31% of answers), loneliness (20%), age, serenity, lack of joy, and even depression (about 15%).

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Positive answers regarding the life satisfaction may have their source in estimation of the closest family's life. Over half (62%) of respondents in general, stated that their children and grandchildren are rather happy. On the base of individual distributions, one could say that two measures of the life quality, namely the satisfaction with the life and happiness of the family, were of noticeable high percentage of their occurrences among older people in selected voivodeships.

14. Two-dimensional analysis

Aiming to estimate the dependence force of the life quality, separating it into two components, namely: satisfaction with the current life and happiness in the family, from two basic features of respondents (age, sex), which seemed to be the basic determinants, there were constructed the correlation tables and the value of Cramer's contingency coefficient was estimated (Luszniewicz and Słaby, 2008: 284)[4]. The results of Cramer's coefficient estimation, related to the satisfaction and happiness compared to the age and sex, in general scale and according to selected voivodeships, are presented in table 2.

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[4] X^2 - Value of chi-square calculated on the base of size from correlation table of 2 x 2, with Yate correction; k – number of lines; 1 – number of columns; n – number of observation units; formula no. 8.19 from cited work of Luszniewicz and Słaby (2008). Due to non-randomness of sample, verification of hypothesis on independence of x and y was ignored. C_{xy} takes values from range (0; 1). In the case when conditional distributions in table are identical and the same as marginal distribution of each feature, independence of features occurs. $C_{xy} = 0$. Moreover, due to non-randomness of sample, verification of any hypothesis and "supporting" numerical values of Cramer coefficient with p-value (level of test probability corresponding with chi-square statistics, which is applied in calculations of this coefficient) is not justified.

Table 2. Values of Cramer's contingency coefficient C_{xy}.

Specification	Coefficient C_{xy}	
	Life satisfaction	Family happiness
Total (n=324) Sex Age	0,03 0,20	0,08 0,20
Lubelskie voivodeship (n=82) Sex Age	0,08 0,23	0,15 0,23
Świętokrzyskie voivodeship (n=91) Sex Age	0,17 0,23	0,15 0,11
Podlaskie voivodeship (n=77) Sex Age	0,09 0,36	0,17 0,18
Warmińsko-Mazurskie voivodeship (n=74) Sex Age	0,04 0,22	0,21 0,21

Source: own elaboration on the base of empirical results obtained during realization of NCN grant no 2013/09/B/HS4/01965, with use if IBM SPSS, version 23.

On the base of results from the table 2, one could notice, that both in general and in voivodeship notation, the life satisfaction is not sex-dependent. Numerical values of Cramer's coefficient C_{xy} indicate also, with similar strength, that positive estimations of the happiness only a little depend from the respondent's sex. Regarding selected determinants, age of respondent has greater influence on the life quality. Therefore, the determinants differentiating the estimations of the life quality, namely the sex and the age, usually accepted as the basic features of older respondents, showed that they are not important.

15. Analysis of variations

In searching for other determinants of marginalization, using quality and dignity of the life as the measures, there was applied analysis of variances, despite of the ordinal character of measurement on 5-grade Likert scale (1932) and purposive selection of respondents (N=400).

Two-factor variants analysis (Neter et al., 1978: 651) was employed to find simultaneous influence of selected determinants presented in table 2 on the feeling that the existence of seniors goes on the life's margin, what causes not only low estimates of their life but also lowers their dignity.

The choice of two-factors analysis of variances was dictated by the awareness that investigated reality (social exclusion of older people being in conditions which are quite difficult for measurements, particularly if related to the villages) is complexed and that its description using only one variable would explain this phenomenon only in a small degree. In the analysis, particular attention was paid to interactions between the life quality and its dignity determinants, and respondents' features (the sex and place of living in selected four voivodeships). It was assumed, that in the investigated sample, the estimation of the life marginalization is a dependent variable of four states: "decidedly yes" (1), "rather yes" (2), "rather not" (3), and decidedly not" (4). The variant "Difficult to say" (5) was not included, due to its residual percentage of occurrence. For the factor "they have no influence on anything" two states: "yes" and "no" were distinguished, due to decided prevailing of "decidedly yes" and "rather yes" in the structure of answers. There was additionally attached the factor "voivodeship" to get the knowledge about influence of the living place of respondent aged 60+ on differentiation of opinions concerning existence at the life's margin. Table 3 presents identification of given sources of dependent variable "existence at margin of life" distribution differentiation. The results were obtaining using STATISTICA 12 program. Sig.level it is so called critical (test) level of significance.

Table 3. Analysis of variances of selected factors influence on existence at margin of the life, sample in general

Factors	Analysis of variances				
	MS Effect	df	MS Error	Test F	Sig. level p
Age	5,889	4		8,559	0,000001
Age	0,322	1	0,688	0,468	0,494335
Interactions: Age&Sex	0,941	4		1,368	0,244770
Useless for anybody	5,747	4	0,639	8,993	0,000010
Interactions: Age&Useless	0,676	16		1,057	0,395779
No influence on anything	3,338	1	0,676	4,937	0,026995
Interactions: Age&No influence	0,810	4		1,198	0,311267
The State is not interested in them	4,729	3		7,027	0,001033
Interactions: Age&State is not interested in them	0,374	12	0,673	0,556	0,813659
Voivodeship	16,390	3		30,073	0,000000
Interactions: Age&Voivodeship	0,583	12	0,545	1,069	0,383793

Source: own elaboration on the base of source materials with use of STATISTICA packet.

The value of Sig .level p in last column is compared to accepted level of significance $\alpha \leq 0{,}05$ and in the case of the age and place of living (voivodeship) does not exceed the critical value, what means that with probability of error with value 0.05, one can state that the age and place of living (voivodeship) have an influence on social exclusion and that these factors indirectly differentiate the opinions on the life quality and dignity determinants. Interaction (conjoint action) of selected factors joined by age and feelings which may cause that aboriginal villages inhabitants aged 60 are sensing the breaking of their life dignity in selected pairs, allowed for the statement that in the conditions of the sample there is lack of their statistically significant combined influence. Thus, one can conclude that the age determines the opinions, regarding its dimension of its influence in each voivodeship. Instead, the opinions are not depending on the sex.

The results of variances analysis indicate strong differentiation of estimates concerning marginalization of the life, not allowing for the life's dignity. The estimates of this phenomenon were dependent from feeling of loneliness and lack of the help from the State. These determinants were confirmed by qualitative research conducted in the second stage, what can be proved by one of the respondents' utterances: "*These people are abandoned for*

themselves, the stress is killing them (...) they are afraid, they are so afraid of loneliness and winter time". Changeable social, customs and cultural situation in villages led to vanishing of traditional forms of common existence, which is leading to apathy, and taking the life's sense away from older people.

The results of qualitative research allowed for confirmation of hypothesis that socio-cultural contexts of seniors living in villages and their sense of honor create the estimates which are more optimistic in quantitative research than in reality.

16. Conclusions and suggestions

Searching for the determinants which are conditioning the estimations of the life quality, with the use of phenomena modeling method is impeded by usually applied measuring scales. Presented attempts to depart from these restrictions allowed to demonstrate the advantages of statistical multidimensional analyses in the context of deepening of searching for complex phenomena conditioning such as the life quality. However, in further studies it is necessary to assure randomness of samples. It could be considered also ignoring of these features of respondents, which are not differentiating the answers in one-dimensional distributions in multidimensional analyses.

The results of applied methods of modeling enabling searching for the determinants of the life quality, allowed for statement that „traditional" features of respondents such as an age or sex usually were not the factors which strongly differentiated the estimates of the life quality. Undoubtedly, to the great extent, the subjective opinions are formulated on the base of complexed psychological and cultural states which are characteristic for many societies. Additionally, presented results of determinants searching allowed to formulate two conclusions: the results being found on the ground of given sample cannot be generalized; the determinants obtained in quantitative research have to be verified in qualitative research in the same group of respondents; the set of the life quality determinants in the same group of respondents.

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Uwarunkowania jakości życia – uwagi metodologiczne

Streszczenie

Jakość życia jest rezultatem stopnia zaspokojenia potrzeb co wynika m.in. z konsumpcji dóbr i usług. Celem pracy jest upowszechnienie wyników prób poszukiwania przez autorkę determinant jakości życia z wykorzystaniem bardziej zaawansowanych metod statystycznych, które przy np. założeniu, iż skalę porządkową potraktuje się jako ilorazową mogą poszerzyć analizę źródeł warunkujących jakość życia uzyskaną na podstawie rozkładów indywidualnych.

Zaprezentowano przy różnym stopniu szczegółowości wyniki modelowania jakości życia ze szczególnym podkreśleniem użyteczności stosowania modelu regresji logitowej z użyciem prawdopodobieństwa skumulowanego. Dane statystyczne zaczerpnięto z realizacji trzech projektów badawczych finansowanych przez NCN w latach 2011-2015.

Słowa kluczowe*:* jakość życia, wykluczenie społeczne, rodziny z niesprawnymi dziećmi, modelowanie jakości życia, determinant jakości życia.