

Recognizing Factors Affecting Manpower Productivity Based on Kano Model

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ABSTRACT

The main purpose of this study was to recognize, classify and determine priority of factors affecting human resource productivity in Chaharmahal and Bakhtiari Province Electricity Distribution Company using Kano model. This study is applied and is descriptive-survey research that is done cross-sectional. Sample size was estimated as 92 personnel of Chaharmahal and Bakhtiari Province Electricity Distribution Company using Morgan Table. Classified random sampling was used in order to select sample and distribute questionnaires. Questionnaire stability was calculated as 0.89 using Cranach's alpha method. Descriptive statistics, single sample Kolmogorov–Smirnov test and Friedman test. Over all, the obtained results prove that 15 out of 11 noticed factors are one- dimensional, 2 are indifferent and 2 are attractive factors. Personnel performance evaluation, meritocracy and performance feedback have first, second and third priority.

KEYWORDS

Chaharmahal and Bakhtiari Province Electricity Distribution Company, Human Resource Productivity, Kano Model, Manpower

INTRODUCTION

Productivity is a factor that guarantees organizational durability; productivity culture dominance leads to optimal usage of organizations material and spiritual facilities and to efflorescence of powers, talents and potential facilities of organization (Soltani, 2005). Desired productivity is not obtained through changing structures, adding technology, agenda preparation and circular issuance but it is human-oriented and includes personal- social and organizational productivity (Saatchi, 2012). Personnel

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must be considered as a gold key of quality improvement and productivity of organizational processes (Tabarsa & Ahadiyan, 2007). Some of the basic questions that all directors must answer include how we can increase human resource productivity and which factors affect human resource productivity. Answering these questions will direct managers in selecting management methods and directing organizational resources (Kazemi et al., 2011).

It is very important to recognize and evaluate factors that guarantee human resource productivity and can underlie other efforts in order to increase human resource productivity through training and other measures. Many factors help an organization in achieving its aims but human resource is very important and unique; if we can achieve organizational productivity under human resource productivity, there will be reasonable relationship between organizational productivity and human resource productivity. Studies and surveys in evaluation and correction of human resource productivity an effective effort in order to improve personnel performance quality level in organization (Purbabakan, 2014).

Allahverdi (2009) introduces factors affecting human resource productivity including: personal factors, organizational culture, organizational structure, organizational management style, training courses, awarding system, physical environment and space. In determining and prioritizing factors affecting human resource productivity, it was known that leader style and organizational management factors are among seven factors affecting human resource productivity. Personal factors, organizational culture, organizational structure, awarding system, training courses and physical environment and space are at other ranks (Allahverdi, 2009). Andre De Grip and Jan Saurmann 2009 show that personnel productivity has increased as 10% after training programs. This productivity is more than personnel correct election productivity (Andre De Grip, 2009). Ahmad Rasdan Esmail et al. (2014) studied on three environmental factors of light, humidity and temperature. The results showed that effective factors are temperature, light and humidity, respectively (Ahmad Rasdan Esmail et al., 2014). When Eshtgarts et al. (2009) tested study hypotheses concluded that there must be a flexible and legitimate structure in order to institutionalize productivity through creativity and innovation and encourage managers and personnel to improve service process, inform personnel of technological developments and provide personnel the opportunity of comment and idea (Ahmadi, 2011). Mojtaba Tavari 2008, considering and evaluating factories status determined important criteria and indices of improving human resource productivity and recognized 38 criteria of 6 managerial, social- psychological, environmental, personal and economic sub-groups. These factors were ranked due to their personal, cultural and social psychological factors and environmental factor has the least importance (Tavari, 2008).

Productivity term was used more than two centuries ago by Cevzny 1766 in an agricultural journal. This term has been used in different cases and levels especially in economic systems (Tangen, 2002). It is mentioned that productivity is one of the important and effective variables on productive- economic activities (Sigh et al., 2000). Productivity is a multidimensional term that its concept is different based

on its context. This term includes total common features. In industrial engineering, productivity is defined as relationship between output and input (Tangen, 2005).

Productivity is continuous effort in order to use new techniques and methods. Productivity is skill, development and improvement of human resources (Europe productivity organization, 1998). Comprehensive definition of productivity states that productivity improvement aims to maximize using human resource productivity, facilities scientifically and through reducing work costs, expanding markets, increasing employment, increasing real income instead of nominal income and improving life criteria in favor of consumer organizations (Japan, productivity organization, 1995).

Factors affecting human resource productivity were recognized using library studies, field studies, and literature (see Table 1).

KANO MODEL

Customer satisfaction was being observed on one-dimensional structure; this means that higher quality of received product by customer, customer satisfaction will be more and vice versa. But it was not considered that completing needs of one product does not require customer satisfaction. On the other hand, type and size of customer need affects received product quality and his satisfaction (Azizi,2012). Professor Nriaki Kano et al. introduced Kano customer satisfaction model in 1984; this model is able to separate three needs of a product that affect customer satisfaction. In fact, Kano

Table 1. Factors affecting manpower productivity

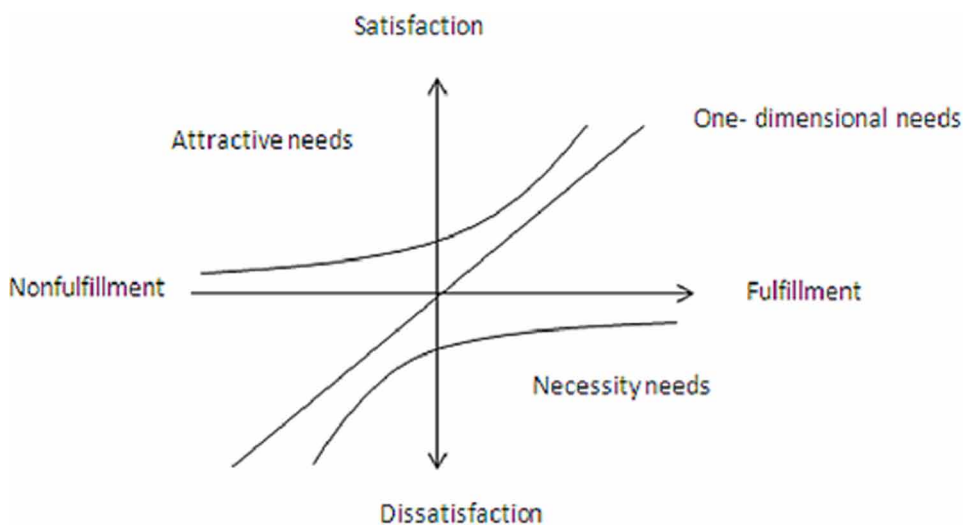
Row	Variables	References
1	Job satisfaction	Management and productivity studies center
2	Job recognition	Hersi and Gold Smith, Kopman (1986)
3	Performance feedback	Management and productivity studies center
4	Rewards	Management and productivity studies center, Nazari (2008), Nobakht (2008)
5	Personnel creativity	Management and productivity studies center
6	Work life quality	Nobakht (2008), Management and productivity studies center
7	Personnel training	Kanen, Taheri (2011), Management and productivity studies center, Emami Mebodi (2005)
8	Personnel motivation	Hersi and Gold Smith, Saatchi (2007), Nazari (2008)
9	Personnel evaluation	Hersi and Gold Smith, Management and productivity studies center
10	Delegation of authority	Hershaver and Rash, Bakel (1995)
11	Personnel cooperation	Kanen, Somans (1993), Nazari (2008), Kopman (1996)
12	Management style	Rejas and Aramvarikol (2003), Tomas and Sakarken (1994), Nobakht (2008), Taheri (2011)
13	Organizational justice	Imed (1997), Sheykhleslami (1998)
14	Meritocracy	Kanen (2002)
15	Work physical environment	Liu et al. (2000), Hersi and Gold Smith, Sotrmaister, Nobakht (2008)

model classified each product needs and its performance and quality features into three groups and each classification shows one type of customer needs. These needs include the following.

Necessity, one-dimensional and attractive needs. Necessity needs are related to features that must be preset in a product and if they are not satisfied, customer will be dissatisfied. On the other hand, if these needs are consistent with customer needs, their completion will not increase customer satisfaction. Necessary or basic features (as a curve in third and fourth quarter of figure) include customer expectation from product that must be present in product. Increase capability of this group reduces returned products to manufacturer that show customer satisfaction but weak performance of these capabilities will lead to customer dissatisfaction. Reinforcement of these features does not increase customer satisfaction but their weakness will lead to reduced satisfaction of customer.

One-dimensional need is related to customer satisfaction and meeting them; that is, if more needs are met, customer satisfaction will be more and vice versa. Customers demand one- dimensional need explicitly. These features maintain company in market. These capabilities increase is desirable in products and improve customer satisfaction and vice versa. Their weakness will lead to reduced customer satisfaction. Attractive needs are related to features of products that affect more customer satisfaction and increase his satisfaction rate (attractive features are shown as curve in second quarter of Figure 1). Customer doesn't express attractive needs explicitly. Attractive needs respond to customer hidden needs (Nriaki Kano, 1984).

Figure 1. Kano's model customer satisfaction (Nriaki Kano, 1984)



TOOLS AND METHODS

Selecting method and tools is the base of activity. According to research issue and since this research describes factors affecting human resource productivity, it is among sectional descriptive studies (objective, real and regular description of events and different subjects) and since certain people are demanded to respond questions in collecting data of surveys, it is considered as descriptive- survey study. Descriptive research method and correlation are used due to research subject and survey purposes. Field method is used in order to collect data and library method is used in terms of theoretical bases and literature; these resources include books, articles, journals and theses. Questionnaires were distributed by in- hand and online forms in Chaharmahal and Bakhtiari Province Electricity Distribution Company in order to collect data.

Study information was collected using questionnaire. Paired items were prepared for each feature of Kano questionnaire so that responder can select one of five options (satisfied, I expect this, indifferent, I don't prefer this and dissatisfied). First question is a functional question that shows customer reaction to a feature and second question is a functional question that shows customer reaction to lack of that feature. Below table converts two parts of question to one response. Present responses in Kano table are classified into six groups (see Table 2).

It must be said that all statistical computations of this study were done using SPSS software version 22. Total number of personnel with Associate Degree and higher degrees in Chaharmahal and Bakhtiari Province Electricity Distribution Company is 122. Total number of sample included 92 subjects and personnel number of each town was determined using relativistic classification. 66 questionnaires were collected among 92 distributed questionnaires and questionnaire return coefficient was 72%. Relativistic classification random sampling method was used in order to select sample and distribute questionnaire. Cranach's alpha method was used in order to calculate questionnaire reliability or validity. Estimated alpha of this study was 0.89.

Table 2. Kano evaluation table

Manpower Productivity Variables		I Don't Prefer the Feature	I Can Deal with It	It Does Not Make Any Difference for Me	The Feature Must Exist	I Like this Feature
Desirable	I like this feature	O	A	A	A	Q
	The feature must exist	M	I	I	I	R
	It does not make any difference for me	M	I	I	I	R
	I can deal with it	M	I	I	I	R
	I don't prefer the feature	Q	R	R	R	R

Note: One-dimensional: O; attractive: A; questionable: Q; must be: M; indifferent: I; reversible: R (Nriaki Kano, 1984)

DATA ANALYSIS

There are different methods in order to examine Kano questionnaire and evaluate manpower productivity. Questionnaire analysis is based on more frequency and the simplest and more usable analysis model of Kano. Table 3 shows Kano questionnaire data analysis results based on the most frequency.

In Figure 2, satisfaction coefficient must be calculated after conducting Kano model steps and determining factors types in terms of necessity, attractiveness, one-dimensional and indifferent. Satisfaction coefficient expresses whether special variable satisfies customers or prevents their dissatisfaction. Negative sign of denominator for dissatisfaction emphasizes negative effects of factor on customer satisfaction. Positive coefficient of customer satisfaction is variable between zero and one and more close to one, its effect will be more on customer satisfaction and more close to zero, its effect will be less on customer satisfaction. Negative coefficient of customer satisfaction is variable between 0 and -1 and more close to -1, its effect will be more on customer satisfaction and more close to 0, its effect will be less on customer satisfaction. Since Kano model is a model for customer satisfaction and we use it in order to classify factors affecting personnel productivity, satisfaction coefficient shows effect of calculated variable on human resource productivity; it means that in negative coefficient, if values are more close to -1, its effect on reduced (lack of) human resource productivity will be more in lack of feature and zero shows that lack of feature will not lead to personnel non-productivity (Fakhariyan,2009). Refer to Table 4.

Table 3. Questionnaire analysis based on high frequency

Variables	A	O	M	I	Q	Type
Job satisfaction	16	20	6	19	5	One- dimensional
Job recognition	16	24	6	14	6	One- dimensional
Performance feedback	22	24	4	6	10	One- dimensional
Rewards	12	21	6	8	19	One- dimensional
Personnel creativity	17	30	3	4	12	One- dimensional
Work life quality	18	26	11	7	4	One- dimensional
Personnel training	11	44	5	4	3	One- dimensional
Personnel motivation	9	37	9	4	7	One- dimensional
Personnel evaluation	23	29	3	7	4	One- dimensional
Delegation of authority	18	16	12	12	8	Attractive
Personnel cooperation	2	8	7	43	6	Indifference
Management style	14	32	5	6	9	One- dimensional
Organizational justice	2	11	4	36	13	Indifference
Meritocracy	26	18	4	13	5	Attractive
Work physical environment	12	37	2	11	4	One- dimensional

Figure 2. Spider chart of variables

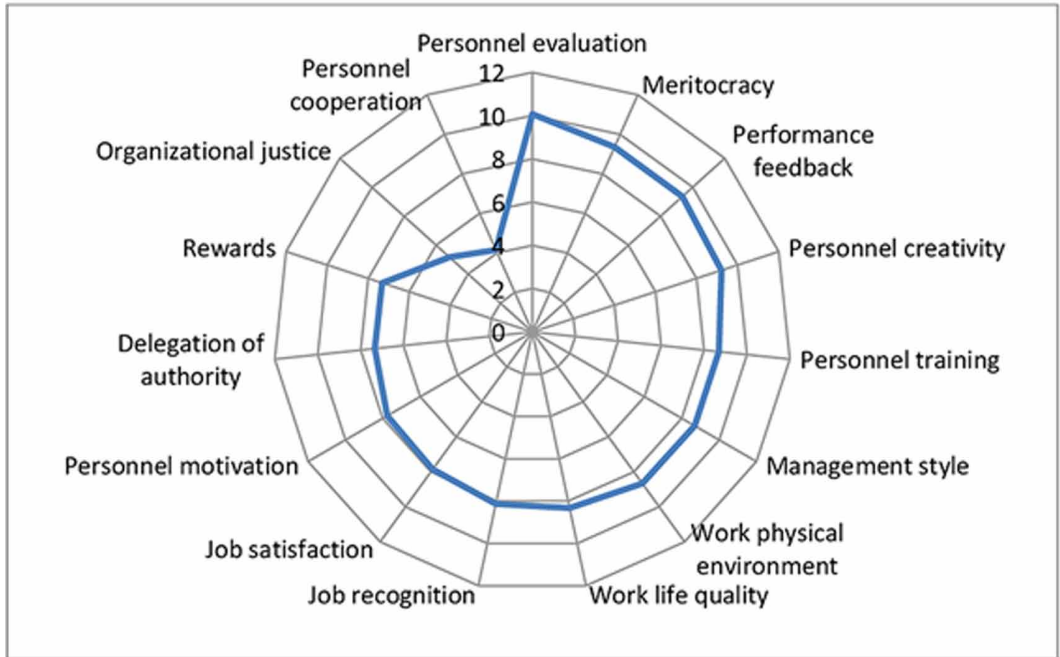


Table 4. Productivity and lack of productivity coefficient for 16 variables of manpower

Variables	Productivity Coefficient	Lack of Productivity Coefficient
Job satisfaction	0.59	-0.42
Job recognition	0.5	-0.36
Performance feedback	0.82	-0.5
Rewards	0.7	-0.57
Personnel creativity	0.87	-0.61
Work life quality	0.38	-0.59
Personnel training	0.85	-0.71
Personnel motivation	0.77	-0.77
Personnel evaluation	0.83	-0.51
Delegation of authority	0.6	-0.5
Personnel cooperation	0.16	-0.25
Management style	0.80	-0.64
Organizational justice	0.24	-0.28
Meritocracy	0.72	-0.36
Work physical environment	0.81	-0.65

- No satisfaction rate (lack of productivity):

$$\frac{M+O}{(A+O+M+I) \times (-1)}$$

- Satisfaction rate (productivity):

$$\frac{A+O}{(A+O+M+I)}$$

Friedman Test or Two-Way ANOVA Test

In this study, since variables distribution is abnormal, non-parametric tests must be used. Similar ranking of variables (significant difference between mean factors) will be evaluated at confidence level of 99% using Friedman test (or two-way ANOVA) (see Table 5).

Table 5. The results of Friedman test and two-way analysis of variance for all variables

Variables	Mean	Rank
Personnel evaluation	10.07	1
Meritocracy	9.36	2
Performance feedback	9.35	3
Personnel creativity	9.22	4
Personnel training	8.70	5
Management style	8.68	6
Work physical environment	8.66	7
Work life quality	8.33	8
Job recognition	8.14	9
Job satisfaction	7.86	10
Personnel motivation	7.76	11
Delegation of authority	7.34	12
Rewards	7.32	13
Organizational justice	5.16	14
Personnel cooperation	4.14	15
Data number		66
The chi-square statistic		139.198
Freedom degree		14
sig value		0.000

CONCLUSION

According to obtained results from classifying factors in terms of necessity, attractiveness, one- dimensionality and indifference and results of prioritizing them, each of them will be dealt with below:

1. **Correct Evaluation System:** This variable occurs at top and within one-dimensional factors group. It improves personnel productivity and lack of this feature will lead to lack of productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this feature are 0.83 and -0.51, respectively that presents more effect on personnel productivity. Since this variable has the highest rank in province electrical company, it shows the appropriateness of system for personnel. Another reason is its continuity;
2. **Meritocracy:** This variable occurs at second place and within attractive factors group; this means that its presence leads to personnel productivity while lack of this factor will lead to personnel non-productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) values are 0.72 and -0.36 that presents its effect on personnel productivity;
3. **Performance Feedback:** This variable occurs at top and within one- dimensional factors. Performance feedback can flourish personnel potential power as productive force and maximize them. Performance feedback is done continuously like evaluation system; one reason for its importance is due to its continuity. Receiving performance feedback by managers and authorities recognize their strengths and weaknesses and improves personnel viewpoint and performance. Another reason for importance of this variable is feedback correctness and validity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.70 and -0.57 that presents its more effect on personnel productivity;
4. **Creativity:** This variable has the fourth position and is among one- dimensional factors. Most of Electrical Distribution Company personnel believe that they need creativity but half of them don't desire complex works that need innovation and creativity and they don't take risk. Productivity coefficient and non- productivity coefficient are 0.87 and -0.61 that show the effect of these factors on human resource productivity;
5. **Training:** This factor is among one- dimensional factors. It improves personnel productivity while lack of training will lead to non- productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.85 and -0.71. The reasons of this variable importance in Electrical Distribution Company include managers' support from training programs, effectiveness of these programs on necessary skills for job higher levels and personnel welcome to seminars and training programs;
6. **Management Style:** There is unique management style with separate set of managerial activities in Electrical Distribution Company from personnel and managers point of view. This variable is at place sixth and occurs within one-

dimensional factors. Its presence will increase personnel productivity and lack of this variable will decrease productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.24 and -0.28 that show the effect of this factor on human resource productivity;

7. **Physical Environment:** This factor is classified as one- dimensional factors. The current building of Electrical Distribution Company is old and limited in terms of rooms and space but it is safe and hygienic. The company constructs new and big building. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.84 and -0.65;
8. **Work Life Quality:** Personnel have job security but don't cooperate in organizational decision. This variable is at place eight and is one- dimensional. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.38 and -0.59 that show the effect of this factor on human resource productivity;
9. **Job Recognition:** This factor is one- dimensional. Job task explanations are provided for Electrical Distribution Company and personnel get different skills for their tasks. Most personnel are dissatisfied from independence of their tasks. It seems that job improvement is long and unknown. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.50 and -0.36;
10. **Job Satisfaction:** This variable is at tenth place and occurs within one-dimensional factors. It improves personnel productivity while lack of this feature will lead to lack of productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.59 and -0.42;
11. **Personnel Motivation:** Personnel of Electrical Distribution Company believe that performance based awarding system is injustice and they do not receive proper awards and welfare facilities; half of personnel believe that there are no clear criteria and processes. This factor is within one-dimensional group. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.77 and -0.77 that show the effect of this factor on human resource productivity;
12. **Delegation of Authority:** This variable is at twelfth place. Personnel believe that they are not delegated authority so that they can decide themselves. It is within attractive factors and improves personnel productivity but lack of this feature will not lead to non- productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.80 and -0.64;
13. **Personnel Awards:** There is no certain place for this variable in Electrical Distribution Company. The weakness of awarding systems is due to the fact that personnel are not acknowledged about awarding codified practices, rules and standards of payment. It occurs within one- dimensional factors. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.70 and -0.57;

14. **Organizational Justice:** This factor occurs within indifferent group and is not within three main classes of Kano model. This means that personnel are indifferent towards this factor. This factor can be removed among factors affecting Electrical Distribution Company human resource productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.72 and -0.36;
15. **Personnel Cooperation:** Personnel believe that their cooperation is not good in company. It occurs within indifferent factors and is not within three main classes of Kano model. This means that personnel are indifferent towards this factor. This factor can be removed among factors affecting Electrical Distribution Company human resource productivity. Satisfaction coefficient (productivity) and dissatisfaction coefficient (lack of productivity) of this factor are 0.80 and -0.64.

In summary, we can say that two factors, organization justice and personnel cooperation can be removed, since they are within indifferent factors then they are not effective factors on Electrical Distribution Company human resource productivity. Delegation of authority and meritocracy are attractive factors and personnel believe that they must work with no attention to these factors. Authorities must pay attention to these factors. If these factors are more available in the company, personnel will be more motivated. Most of factors occur within one- dimensional factors, this means that improving these factors will lead to personnel productivity.

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