A STUDY ON HOSHIN KANRI PLANNING SYSTEM APPLICATIONS IN COMPANIES THAT HAVE RECEIVED ISO 9001-9002 CERTIFICATIONS FROM THE TURKISH STANDARDS INSTITUTION

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Hoshin Kanri; long-term view; customer, contingency-and-data, product/service oriented; employee improvement; participation; PDCA (Plan-Do-Check-Act); scientific, logical approach; and creativity.

ABSTRACT

Following the international trends and today's highly competitive environment, it is important that every organization throughout the world should strive for better performance. In order to provide a consistent mission and vision along with the strategic plan, the objectives and actions regarding each unit and individual within the organization must be well-defined and aligned with business priorities. Differing from other systems of planning; Hoshin Kanri Planning comprises every part of an organization.

Evolved in Japan as a system of planning and deployment, Hoshin Kanri Planning is widely used around the world by many leading companies. Its purpose is to be aware of the status quo and make a major performance improvement by analyzing current problems and deploying in response to environmental conditions. With Hoshin Kanri Planning, top management vision can be translated into a set of coherent, consistent, understandable and attainable policies and actions, and can be easily applied at all levels and in all functions of the organization. Among the initial considerations in the Hoshin Kanri Planning approach to business system change are; (1) measuring the business system as a whole, (2) setting core objectives of the business, and (3) understanding the environmental situation in which the business operates. The intention is that, in companies using Hoshin Kanri Planning, everybody is aware of management's vision and individuals become capable to run their projects to successful conclusions through coordinated business processes.

In this study, the aim is to provide a broad view of Hoshin Kanri Planning System applications in the Turkish companies that have already implemented ISO 9001-9002 certification. The research comprises companies that have received the above-mentioned certificates from TSE, the Turkish Standards Institution, by the years 1998 and 1999.

[1] This study is conducted with the equally participation of the indicated authors.

1. HOSHIN KANRI PLANNING SYSTEM

Hoshin Kanri is considered to be a system of planning and deployment which evolved in Japan and is currently used by many leading companies[1]. The quality management principles and practices within the Japanese industry were initially introduced by the Japanese Union of Scientists and Engineers in 1950's and this has led to the widespread use of the plan-do-check-act cycle. Along with these developments, the idea concerning a company-wide management system began to generate and by the late 1960's companies, including Bridgestone, Toyota and Matsushita, began to develop their own innovative approaches and these efforts created the basis of Hoshin Kanri Planning. By the late 1970's, the experience accumulated in industry had appeared as books on the subject. The first authoritive text in English was translated and edited by Yoji Akao from Japanese, in which the term "Hoshin Kanri" was described as a planning, implementation, and review system for managed change (Akao 1991)[2]. By the late 1980's, western companies began to implement their own versions of Hoshin Kanri including Procter and Gamble, Hewlett Packard, and Xerox. Today, Hoshin Kanri Planning can be defined as a proven technique to help organizations focus on efforts and achieve objectives[3].

The Japanese term, "Hoshin Kanri", originally means the "shining metal" + "compass (pointing direction)"[4]. A brief definition for Hoshin Kanri Planning can be given as "a planning and management system that focuses and aligns the organization to achieve breakthroughs for customers"[5]. The main purpose is to communicate company policy to everyone in the organization[6]. Hoshin Kanri Planning (or alternatively Policy Deployment according to some authors[7]) can also be defined as a step-by-step planning, implementation, and review process through the systems approach to the management of change in critical business processes[8]. Hoshin Kanri Planning, based on the PDCA process, can be indicated as in the diagram below (Figure 1).

Hoshin Kanri actually does not replace other management strategies, furthermore, it coordinates continuous improvement and breakthroughs. Briefly, Hoshin Kanri Planning focuses on the vertical alignment of organizational activities to the strategic goals of the organization, by setting the course of the company in the same direction as a compass[9]. The key elements that are components of Hoshin Kanri Planning can be listed as follows[10]:

- Focusing on the organization,
- Commitment to customers,

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[1] David Hutton, Consultancy in Quality Management, http://www.dhutton.com/visitors/articles/arthoshin.html, March 2000.

[2] The Hoshin Kanri Research Project, http://www.mgt.uae.ac.uk/research/hoshin, March 2000.

[3] Total Quality Engineering, http://www.tqe.com/hoshin.html, March 2000.

[4] Workforce Performance, http://www.opm.gov/perform/articles/038.htm, March 2000.

[5] http://dizzy.library.arizona.edu/library/teams/slrp/syllabus/hoshin.html, January 2000.

[6] Total Quality Engineering, http://www.tqe.com/hoshin.html, March 2000.

[7] The Hoshin Kanri Research Project and A Few Words About Hoshin Kanri, http://www.johnstark.com/fwhsh.html, July 1999.

[8] http://goalqpc.com/RESEARCH/plan.html, March 2000.

[9] Aliah and Hoshin Planning, http://aliah.pgh.pa.us/Aliah/hoshin.html, March 2000.

[10] http://dizzy.library.arizona.edu/library/teams/slrp/syllabus/hoshin.html, January 2000, and "Değişim Rüzgarını Hoshin Kanri Yönlendiriyor", MESS Gazetesi, Yıl: 36, Sayı: 718, Ekim 1999, p: 10-11.

- Deployment of the organization's focus,
- Collective wisdom to develop the plan,
- Management tools and techniques,
- Ongoing evaluation of progress to facilitate learning and continuous improvement,
- Allocating resources.

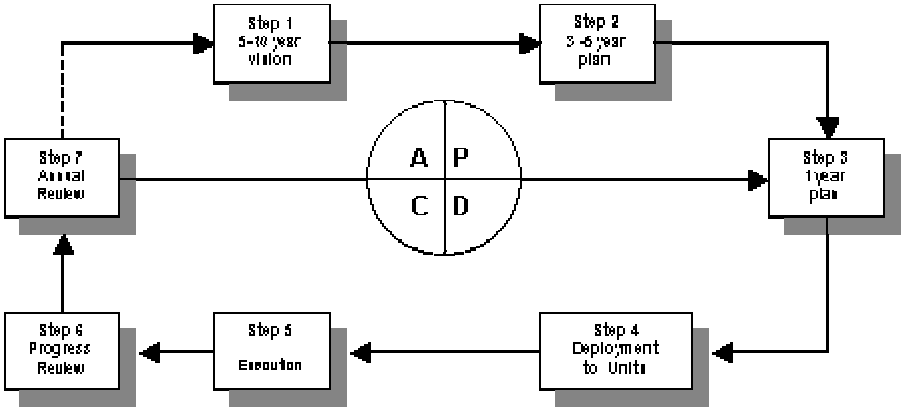

Figure 1. Hoshin Kanri Planning Process (http://goalqpc.com/RESEARCH/plan.html)

2. PURPOSE OF THE STUDY

This study was conducted on the manufacturing and the service firms that have received ISO 9001-9002 certifications from the Turkish Standards Institution in 1998 and 1999. The study is based on two main purposes. First, it aims to find out the average values of certain variables; Hoshin Kanri Planning, being customer oriented, "my problem" point of view, long-term view and forecasting, being contingency-and-data-oriented, being product/service oriented, employee improvement, participation of all departments, applying the PDCA cycle, scientific and logical approach, creativity for producing new methodologies[1]. Then, it is aimed to determine whether relations exist among these variables and to identify the directions and the strengths of these relations in these firms. Sub-purposes along with the above aims are to precise whether there exist a relation among the;

- Hoshin Kanri Planning variable and being customer oriented, "my problem" point of view, long-term view and forecasting, being contingency-and-data-oriented, being product/service oriented, employee improvement, participation of all departments, applying the PDCA cycle, scientific and logical approach, creativity for producing new methodologies variables,
- being customer oriented variable and the other variables respectively,
- "my problem" point of view variable and the other variables respectively,
- long-term view and forecasting variable and the other variables respectively,

[1] Indicated respectively as; HOSH, CUST, PROB, LONG, DATA, PROD, EMP, DEP, PDCA, SCIEN, and METH.

- being contingency-and-data-oriented variable and the other variables respectively,
- being product/service oriented variable and the other variables respectively,
- employee improvement variable and the other variables respectively,
- participation of all departments variable and the other variables respectively,
- applying the PDCA cycle variable and the other variables respectively,
- scientific and logical approach variable and the other variables respectively,
- creativity for producing new methodologies variable and the other variables respectively,
- and to identify their directions and strengths.

The second purpose is to find out how being customer oriented, "my problem" point of view, long-term view and forecasting, being contingency-and-data-oriented, being product/service oriented, employee improvement, participation of all departments, applying the PDCA cycle, scientific and logical approach, creativity for producing new methodologies variables affect Hoshin Kanri Planning variable in the above defined manufacturing and service firms.

3. HYPOTHESES

1. H_1: There is a relationship between Hoshin Kanri Planning and being customer oriented.
2. H_1: There is a relationship between Hoshin Kanri Planning and "my problem" point of view.
3. H_1: There is a relationship between Hoshin Kanri Planning and long term view and forecasting.
4. H_1: There is a relationship between Hoshin Kanri Planning and being contingency-and-data-oriented.
5. H_1: There is a relationship between Hoshin Kanri Planning and being product/service oriented.
6. H_1: There is a relationship between Hoshin Kanri Planning and employee improvement
7. H_1: There is a relationship between Hoshin Kanri Planning and participation of all departments.
8. H_1: There is a relationship between Hoshin Kanri Planning and applying the PDCA cycle.
9. H_1: There is a relationship between Hoshin Kanri Planning and scientific and logical approach.
10. H_1: There is a relationship between Hoshin Kanri Planning and creativity for producing new methodologies.

4. VARIABLES, DIMENSIONS, AND THE SCALE USED

In this study, data are gathered through 11 variables, which consist of various dimensions. Based on Likert-type of scale of 1 through 5, expressions regarding each variable are determined as "strongly agree", "agree", "uncertain", "disagree", and "strongly disagree".

Variables and their respective dimensions are as follows[1]:

- **Hoshin Kanri Planning (HOSH):** Vision, long-term planning, moderate-term planning, making one-year plan, diffusing the plan all through the organization, directing the plan, viewing the plan monthly, viewing the plan yearly, five-year-plan viewing, PDCA cycle, and moderate-term planning.
- **Being customer oriented (CUST):** Determining the customer, determining customer requirements and needs, responding customer expectations, taking customer complaints into consideration, providing after-sale services, providing information about features of the product and service.
- **"My problem" point of view (PROB):** Clarified and achievable targets, target possession by the right person, penetrating same targets for each department, accepting false outcomes, job possession, responsibility possession, authorization, searching the problem in "my" job first, looking for the source of the problem instead of punishment, "we" approach instead of "they".
- **Long-term view and forecasting (LONG):** Mission and vision establishment, deployment of long-term management strategies into all levels, transformation of vision into reality, implementation of new applications against changing conditions, sensitive approach of top management against changing conditions.
- **Being contingency-and-data-oriented (DATA):** Internal data, external data, and information flow system.
- **Being product/service oriented (PROD):** Designing the product according to customer expectations, maximum technological availability for production with exact design, product-oriented design of the production process, capability of flexible production that can reflect diverse customer requirements on the product, continuous review of processes for product development and production.
- **Employee improvement (EMP):** Training, empowerment, participating in decisions, career planning, performance appraisal, and rotation.
- **Participation of all departments (DEP):** Team work, improving a suggestion system, democratic environment, rewarding system.
- **Applying the PDCA cycle (PDCA):** Planning, doing, acting, checking, continuity, deployment of PDCA cycle into each level of the whole firm.

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[1] Joseph V. Quigley, Vizyon Oluşturulması, Geliştirilmesi ve Korunması, Çev: Berat Çelik, İstanbul: Epsilon Yayıncılık Hiz. Tic. San. Ltd. Şti., p: 29-32; Richard F. Gerson, Müşteri Tatmininde Süreklilik, İstanbul: Rota Yayınları, 1997, p: 73-89; http://goalqpc.com/RESEARCH/plan.html, March 2000; Fred R. David, Strategic Management, New Jersey: Prentice Hall, Inc., Seventh Edition, 1998, p:10,82-83; http://www.iqd.com/Hoshin_Sp.htm, March 2000; Cem Cüneyt Arslantaş, "Yeni Bir Yönetim Stratejisi Olarak Dış Kaynaklardan Yararlanma ve İlaç Sanayiinde Faaliyet Gösteren Firmaların Dış Kaynaklardan Yararlanma Uygulamaları", İ. Ü. Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi (MS), 1999, p: 48-49; Işıl Mendeş Pekdemir, İşletmelerde Kalite Yönetimi, İstanbul: Beta Basım Yayın Dağıtım A.Ş., 1992, p: 1-4; Aykut Berber, "Quality Function Deployment and Impacts of the Organizational Issues on Basic Prerequisites for Its Implementation", İ. Ü. İşletme Fakültesi İşletme İktisadı Enstitüsü Yönetim Dergisi, Yıl: 10, Sayı: 34, Ekim 1999, p: 41-56; Tuğray Kaynak ve d., İnsan Kaynakları Yönetimi, İstanbul: İ. Ü. İşletme Fakültesi Yayını, 1998, p: 19-20; Anne Donnellon, Takım Dili, Çev: Osman Akınhay, İstanbul: Sistem Yayıncılık, 1998, p: 11-20; "TQM: Hoshin Management", http://www.iqd.com/Hoshin_Mgn.htm, March 2000; Harry, Nystrom, "Creativity and Entrepreneurship", Creative Action in Organizations, Ivory Tower Visions & Real World Voices, Edited by Cameron M. Ford, Dennis A. Gioia, Sage Publications, 1995, p: 239-243.

- **Scientific and logical approach (SCIEN):** Scientific and logical approach in; management functions, management-leadership style, performing tasks, business functions, allocating sources, new investments.
- **Creativity for producing new methodologies (METH):** Availability for idea generation and implementation, employee encouragement for innovation and creativity, continuous improvement orientation.

5. EXTENT, LIMITATIONS AND METHODOLOGY OF THE RESEARCH

This study includes all manufacturing and service firms that received ISO 9001-9002 certifications from the Turkish Standards Institution by 1998 and 1999.

The study was conducted by a survey instrument, which was mailed to all the 315 firms that belong to the above-mentioned category. As the firms are located in different regions (including even Germany, Liechtenstein and USA), we have decided to mail the survey and additionally to re-send by fax in request. A total of 55 responses were returned with valid responses, and 14 copies were returned due to address changes, except one, which was not responded due to the lack of language. The response rate is, therefore, 18%.

6. STATISTICAL TECHNIQUES USED IN THE RESEARCH

To insure the reliability of the survey instrument, the most popular reliability analysis; Alpha Model[1] was conducted and the alpha values that are the reliability coefficient were calculated. The overall reliability of the survey measured as Cronbach's alpha is .9893. As the alpha values that demonstrate the reliability coefficient are quite close to 1, the survey instrument is considered to be a reliable one.

The data gathered by the research were processed through "SPSS for MS Windows 8.0". At the first stage, the descriptive measures for the arithmetic mean and standard deviation were calculated. "Correlation analysis technique" was used to describe the degree to which one variable[2]. As n>30, "z-test" was applied to determine the level of significance of the relations expressed by the calculated correlation coefficients[3].

"Regression analysis" was conducted to measure the effect of the independent variables on the dependent variable[4]. To insure the significance of the calculated regression coefficients, F-tests conducted with Anova tables were used[5]. The value of p was referred to as 5%.

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[1] Ümit Fırat, Marmara Üniversitesi Sosyal Bilim Öğrencilerinin Fakülte ve Bölümler Bazında Farklılıklarının Çok Değişkenli İstatistik Teknikler İle Analizi, İstanbul: Marmara Üniversitesi Yayını, 1996, p: 33'den H. H. Harman, Modern Factor Analysis, Third Ed. Revised, The University of Chicago Press, Chicago, 1976, p: 230.

[2] Richard I. Levin and David S. Rubin, Statistics for Management, New Jersey: Prentice Hall, Seventh Edition, 1998, p: 677.

[3] Neyran Orhunbilge, Uygulamalı Regresyon ve Korelasyon Analizi, İstanbul: Avcıol Basım Yayın, 1996, p:29

[4] Nicholas R. Farnum and LaVerne W. Stanton, Quantitative Forecasting Methods, Boston: PWS-Kent Publishing Company, 1989, p: 249.

[5] John Neter, William Wasserman and Michael H. Kunter, Applied Linear Statistical Models, Irwin Inc., 1990, p: 271-287.

7. AVERAGE VALUES FOR THE VARIABLES

Exhibit-1. Descriptive Measures for the Variables

	n	Minimum	Maximum	Mean	Std. Deviation
Hoshin Kanri Planning	55	1.00	5.00	4.2364	.8157
Being customer oriented	55	2.00	5.00	4.3091	.7422
"My problem" point of view	55	2.00	5.00	4.3636	.8895
Long-term view and forecasting	55	1.00	5.00	4.1091	.9164
Being contingency -and-data oriented	55	2.00	5.00	4.5636	.7880
Being product/service oriented	55	2.00	5.00	4.4364	.6601
Employee improvement	55	2.00	5.00	4.0182	.9328
Participation of all departments	55	1.00	5.00	4.3273	.8401
Applying the PDCA cycle	55	1.00	5.00	4.5818	.7376
Scientific and logical approach	55	1.00	5.00	3.9455	1.0077
Creativity for producing new methodologies	55	1.00	5.00	4.1091	1.0831
Valid N (listwise)	55				

7.1 DESCRIPTIVE MEASURES FOR THE VARIABLES

As mentioned before, our survey instrument was conducted on manufacturing and service firms based on the Likert-type of scale of 1 through 5. The median value of the scale is, naturally, 3. As seen in Exhibit 1, each variable has a mean average value of more than 4 which is quite over 3, the median value (except for one which is very close to 4). This result shows us that the variables do support Hoshin Kanri Planning system within an organization.

7.2 HOSHIN KANRI PLANNING

The average value for the firms on which our survey was conducted, is 4.24 (Exhibit 1). This figure is close to 5, therefore we can imply that these firms consider on vision, long-term planning, moderate-term planning, making one-year plan, diffusing the plan all through the organization, directing the plan, viewing the plan monthly, viewing the plan yearly, the PDCA cycle, and moderate-term planning.

7.3 BEING CUSTOMER ORIENTED

As seen in Exhibit 1, the average value regarding this variable is 4.31, which is also close to the greatest value of the scale. This shows us that the firms are customer- oriented which means that they take customer requirements, needs and complaints into consideration; provide after-sale services and information about the features of the product and service; respond customer expectations.

7.4 "MY PROBLEM" POINT OF VIEW

Exhibit 1 demonstrates that the average value for "my problem" point of view variable is 4.36. Being close to 5, this value implies that targets are clarified and achievable; possessed by the right person, penetrated equally for each department in these firms. This value also figures out the existence of accepting false outcomes, job possession, responsibility possession, authorization, searching the problem in "my" job first, looking for the source of the problem instead of punishment, and "we" approach instead of "they".

7.5 LONG-TERM VIEW AND FORECASTING

As seen in Exhibit 1, the average value for this variable is determined as 4.11. This figure is close to 5, therefore, it implies that mission and vision establishment, deployment of long-term management strategies into all levels, transformation of vision into reality, implementation of new applications against changing conditions, sensitive approach of top management against changing conditions are considered crucially within the surveyed firms.

7.6 BEING CONTINGENCY-AND-DATA-ORIENTED

The calculated average value for this variable is 4.56 (Exhibit 1), which is very close to the end of the scale. This demonstrates strongly that the considered firms are contingency and data oriented by using internal and external data as well as information flow system.

7.7 BEING PRODUCT/SERVICE ORIENTED

The average value for this variable is 4.44 (Exhibit 1), which figures out that the surveyed firms are product and service oriented with their strict considerations on designing the product according to customer expectations; maximum technological availability for production with exact design; product-oriented design of the production process, capability of flexible production that can reflect diverse customer requirements on the product; continuous review of processes for product development and production.

7.8 EMPLOYEE IMPROVEMENT

As seen in Exhibit 1, the average value regarding this variable is 4.02. This value figures out that training, empowerment, participating in decisions, career planning, performance appraisal, and rotation are widely used.

7.9 PARTICIPATION OF ALL DEPRATMENTS

The calculated average value for this variable is 4.33 as seen in Exhibit 1 and it implies that team work, improving a suggestion system, democratic environment, rewarding system are commonly used.

7.10 APPLYING THE PDCA CYCLE

The average value calculated for this variable is 4.58 (Exhibit 1), which is very close to the end of the scale. This shows us that these firms apply the PDCA cycle and deploy it into each of their levels.

7.11 SCIENTIFIC AND LOGICAL APPROACH

As seen in Exhibit 1, the average value for this variable is 3.95. This value implies us that the firms approach the management functions, management-leadership style, performing tasks, business functions, allocating sources, and new investments in scientific and logical manner.

7.12 CREATIVITY FOR PRODUCING NEW METHODOLOGIES

The average value for this variable is 4.11 (Exhibit 1), which demonstrates us that the internal environment in these firms are available for idea generation and implementation, employee encouragement for innovation and creativity, and continuous improvement orientation.

8. RELATIONSHIP BETWEEN VARIABLES

Exhibit-2. Correlation Analysis Among Variables (n=55)*

	Hoshin Kanri Planning	Being Customer-Oriented	"My problem" Point of View	Long-term View and Fore-casting	Being Contin-gency-and data-oriented	Being Product / Service Oriented	Employee Improve-ment	Participa-tion of All Depart-ments	Applying the PDCA Cycle	Scientific and Logical Approach
Being Customer-Oriented	.642									
	.000									
"My problem" Point of View	.594	.640								
	.000	.000								
Long-term View and Forecasting	.758	.766	.746							
	.000	.000	.000							
Being Contingency-and-data-oriented	.596	.615	.706	.734						
	.000	.000	.000	.000						
Being Product / Service Oriented	.630	.589	.545	.746	.693					
	.000	.000	.000	.000	.000					
Employee Improvement	.700	.607	.728	.713	.641	.619				
	.000	.000	.000	.000	.000	.000				
Participation of All Departments	.642	.607	.755	.771	.695	.740	.772			
	.000	.000	.000	.000	.000	.000	.000			
Applying the PDCA Cycle	.567	.579	.631	.617	.636	.648	.684	.793		
	.000	.000	.000	.000	.000	.000	.000	.000		
Scientific and Logical Approach	.647	.592	.622	.668	.692	.677	.730	.700	.666	
	.000	.000	.000	.000	.000	.000	.000	.000	.000	
Creativity for Producing New Methodologies	.578	.671	.688	.715	.751	.709	.750	.733	.661	.769
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

* Correlation is significant at the .01 level (2-tailed).

A correlation analysis has been conducted to examine the relationships among Hoshin Kanri Planning, being customer oriented, "my problem" point of view, long-term view and forecasting, being contingency-and-data-oriented, being product/service oriented, employee improvement, participation of all departments, applying the PDCA cycle, scientific and logical approach, and creativity for producing new methodologies variables and below findings were determined:

- Positive and significant relationship between Hoshin Kanri Planning and being customer oriented was found at a moderate level (r=.64, p=.00). Therefore, the first hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and "my problem" point of view was found at a moderate level (r=.59, p=.00). Therefore, the second hypothesis was accepted.

- Positive and significant relationship between Hoshin Kanri Planning and long-term view-and- forecasting was found at a high level (r=.76, p=.00). Therefore, the third hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and being contingency-and-data-oriented was found at a moderate level (r=.60, p=.00). Therefore, the fourth hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and being product/service oriented was found at a moderate level (r=.63, p=.00). Therefore, the fifth hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and employee improvement was found nearly at a high level (r=.70, p=.00). Therefore, the sixth hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and participation of all departments was found at a moderate level (r=.64, p=.00). Therefore, the seventh hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and applying the PDCA cycle was found at a moderate level (r=.57, p=.00). Therefore, the eighth hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and scientific and logical approach was found at a moderate level (r=.65, p=.00). Therefore, the ninth hypothesis was accepted.
- Positive and significant relationship between Hoshin Kanri Planning and creativity for producing new methodologies was found at a moderate level (r=.58, p=.00). Therefore, the tenth hypothesis was accepted.

Along with the previously developed hypotheses, other significant relationships among variables that are determined by the correlation analysis are given below:

- Positive and significant relationship between long-term-view-and-forecasting and being customer oriented was found at a high level (r=.76, p=.00).
- Positive and significant relationship between long-term-view-and-forecasting and being product/service oriented was found at a high level (r=.75, p=.00).
- Positive and significant relationship between being product/service oriented and being contingency-and-data oriented was found at a moderate level (r=.69, p=.00).
- Positive and significant relationship between employee improvement and “my problem” point of view found at a high level (r=.73, p=.00).
- Positive and significant relationship between participation of all departments and “my problem” point of view was found at a high level (r=.76, p=.00).
- Positive and significant relationship between participation of all departments and employee improvement was found at a high level (r=.77, p=.00).
- Positive and significant relationship between scientific and logical approach and employee improvement was found at a high level (r=.73, p=.00).

- Positive and significant relationship between scientific and logical approach and long-term view-and-forecasting was found at a moderate level (r=.67, p=.00).
- Positive and significant relationship between being contingency-and-data-oriented and scientific and logical approach was found nearly at a moderate level (r=.69, p=.00).
- Positive and significant relationship between being product/service oriented and creativity for producing new methodologies was found nearly at a high level (r=.71, p=.00).
- Positive and significant relationship between employee improvement and creativity for producing new methodologies was found at a high level (r=.75, p=.00).
- Positive and significant relationship between scientific and logical approach and creativity for producing new methodologies was found at a high level (r=.77, p=.00).

9. EFFECT OF INDEPENDENT VARIABLES ON THE DEPENDENT VARIABLE: STEPWISE REGRESSION ANALYSIS RESULTS

Exhibit-3. Regression Analysis (n=55, p=.05)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.813[a]	.662	.585	.5256
2	.813[b]	.662	.594	.5198
3	.813[c]	.661	.602	.5143
4	.813[d]	.661	.610	.5094
5	.812[e]	.659	.616	.5053
6	.809[f]	.655	.619	.5033
7	.805[g]	.648	.620	.5030
8	.796[h]	.634	.613	.5077
9	.791[i]	.626	.612	.5082

a) Predictors: (Constant), METH, PDCA, CUST, PROB, PROD, SCIEN, DATA, EMP, LONG, DEP
b) Predictors: (Constant), METH, PDCA, CUST, PROB, PROD, SCIEN, EMP, LONG, DEP
c) Predictors: (Constant), METH, CUST, PROB, PROD, SCIEN, EMP, LONG, DEP
d) Predictors: (Constant), METH, CUST, PROB, PROD, SCIEN, EMP, LONG
e) Predictors: (Constant), METH, CUST, PROD, SCIEN, EMP, LONG
f) Predictors: (Constant), METH, CUST, SCIEN, EMP, LONG
g) Predictors: (Constant), METH, SCIEN, EMP, LONG
h) Predictors: (Constant), SCIEN, EMP, LONG
i) Predictors: (Constant), EMP, LONG

As seen in Exhibit 3. Hoshin Kanri Planning is used as the dependent variable while others (being customer oriented, "my problem" point of view, long-term view and forecasting, being contingency-and-data-oriented, being product/service oriented, employee improvement, participation of all departments, applying the PDCA cycle, scientific and logical approach, creativity for producing new methodologies) are considered to be independent. There exits a great effect of independent variables on the dependent variable ($r^2_{1.234567891011}$=.813). In order to insure that the relation is significant, F-tests were applied by using the Anova table seen in Exhibit 4 and the result appeared to be significant at the 5% level.

Once Hoshin Kanri Planning variable was taken as dependent whereas others with the exception of being contingency-and-data oriented were referred to as independent. It was found that the variables of being customer oriented, "my problem" point of view, long-term view and forecasting, being product/service oriented, employee improvement, participation of

all departments, applying the PDCA cycle, scientific and logical approach, creativity for producing new methodologies have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.23467891011}$=.813). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). This monitors that being contingency-and-data oriented has no effect on the dependent variable.

Exhibit-4. Anova: Variance Analysis and F-tests

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.774	10	2.377	8.607	.000[a]
	Residual	12.154	44	.276		
	Total	35.927	54			
2	Regression	23.769	9	2.641	9.774	.000[b]
	Residual	12.159	45	.270		
	Total	35.927	54			
3	Regression	23.758	8	2.970	11.226	.000[c]
	Residual	12.169	46	.265		
	Total	35.927	54			
4	Regression	23.731	7	3.390	13.065	.000[d]
	Residual	12.196	47	.259		
	Total	35.927	54			
5	Regression	23.670	6	3.945	15.448	.000[e]
	Residual	12.258	48	.255		
	Total	35.927	54			
6	Regression	23.517	5	4.703	18.571	.000[f]
	Residual	12.410	49	.253		
	Total	35.927	54			
7	Regression	23.277	4	5.819	23.002	.000[g]
	Residual	12.650	50	.253		
	Total	35.927	54			
8	Regression	22.782	3	7.594	29.464	.000[h]
	Residual	13.145	51	.258		
	Total	35.927	54			
9	Regression	22.498	2	11.249	43.558	.000[i]
	Residual	13.429	52	.258		
	Total	35.927	54			

a) Predictors: (Constant), METH, PDCA, CUST, PROB, PROD, SCIEN, DATA, EMP, LONG, DEP
b) Predictors: (Constant), METH, PDCA, CUST, PROB, PROD, SCIEN, EMP, LONG, DEP
c) Predictors: (Constant), METH, CUST, PROB, PROD, SCIEN, EMP, LONG, DEP
d) Predictors: (Constant), METH, CUST, PROB, PROD, SCIEN, EMP, LONG
e) Predictors: (Constant), METH, CUST, PROD, SCIEN, EMP, LONG
f) Predictors: (Constant), METH, CUST, SCIEN, EMP, LONG
g) Predictors: (Constant), METH, SCIEN, EMP, LONG
h) Predictors: (Constant), SCIEN, EMP, LONG
i) Predictors: (Constant), EMP, LONG
j) Dependent Variable: HOSH

When Hoshin Kanri Planning variable is taken as dependent and others with the exception of being contingency-and-data oriented and applying the PDCA cycle are referred to as independent, it is to be found that the variables of being customer oriented, “my problem” point of view, long-term view and forecasting, being product/service oriented, employee improvement, participation of all departments, scientific and logical approach, creativity for producing new methodologies have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.2346781011}$=.813). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). Therefore, no effect exists for applying the PDCA cycle variable on the dependent variable.

Once Hoshin Kanri Planning variable was taken as dependent while others with the exception of being contingency-and-data oriented, applying the PDCA cycle and participation of all departments were referred to as independent, it was found that the variables of being customer oriented, "my problem" point of view, long-term view and forecasting, being product/service oriented, employee improvement, scientific and logical approach, and creativity for producing new methodologies have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.234671011}$=.813). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). Obviously, there exists no effect of participation of all departments variable on the dependent variable.

Hoshin Kanri Planning variable was taken as dependent while others with the exception of being contingency-and-data oriented, applying the PDCA cycle, participation of all departments and "my problem" point of view were referred to as independent, It was found that the variables of being customer oriented, long-term view and forecasting, being product/service oriented, employee improvement, scientific and logical approach, creativity for producing new methodologies have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.24671011}$=.812). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). This shows that there is a little effect of "my problem" point of view variable on the dependent variable.

Referring to Hoshin Kanri Planning as the dependent variable while others with the exception of being contingency-and-data oriented, applying the PDCA cycle, participation of all departments, "my problem" point of view and being product/service oriented are referred to as independent, it was found that the variables of being customer oriented, long-term view and forecasting, employee improvement. scientific and logical approach, and creativity for producing new methodologies have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.2471011}$=.809). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). This shows that there is a little effect being product/service oriented variable on the dependent variable.

Once Hoshin Kanri Planning variable was taken as dependent whereas others with the exception of being contingency-and-data oriented, applying the PDCA cycle, participation of all departments, "my problem" point of view, being product/service oriented and being customer oriented were referred to as independent, it was found that the variables of long-term view and forecasting, employee improvement, scientific and logical approach, and creativity for producing new methodologies have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.471011}$=.805). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). This monitors that there is a little effect of being customer oriented variable on the dependent variable.

Once Hoshin Kanri Planning variable was taken as dependent whereas others with the exception of being contingency-and-data oriented, applying the PDCA cycle, participation of all departments, "my problem" point of view, being product/service oriented, being customer oriented and creativity for producing new methodologies are referred to as independent, It was found that the variables of long-term view and forecasting, employee improvement, and scientific and logical approach have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.4710}$=.796). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). Therefore it is obvious that there is a little effect of creativity for producing new methodologies variable on the dependent variable.

Once Hoshin Kanri Planning variable was taken as dependent whereas others with the exception of being contingency-and-data oriented, applying the PDCA cycle, participation of all departments, "my problem" point of view, being product/service oriented, being customer oriented, creativity for producing new methodologies and scientific and logical approach are

referred to as independent, it was found that the variables of long-term view and forecasting, and employee improvement have great effect on the variable of Hoshin Kanri Planning ($r^2_{1.47}$=.791). The Anova table in Exhibit 4 insures that this result is significant at the 5% level (p=.00). This shows that there is a little effect of scientific and logical approach variable on the dependent variable.

Exhibit-5. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.758[a]	.574	.566	.5373
2	.791[b]	.626	.612	.5082

a) Predictors: (Constant), LONG
b) Predictors: (Constant), LONG, EMP

Exhibit-6. Anova: Variance Analysis and F-tests

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.625	1	20.625	71.435	.000[a]
	Residual	15.302	53	.289		
	Total	35.927	54			
2	Regression	22.498	2	11.249	43.558	.000[b]
	Residual	13.429	52	.258		
	Total	35.927	54			

a) Predictors: (Constant), LONG
b) Predictors: (Constant), LONG, EMP
c) Dependent Variable: HOSH

As seen in Exhibit 5, when Hoshin Kanri Planning variable was taken as dependent while long-term view and forecasting variable was considered as the independent variable (ie. being contingency-and-data oriented, applying the PDCA cycle, participation of all departments, “my problem” point of view, being product/service oriented, being customer oriented, creativity for producing new methodologies and scientific and logical approach and employee improvement were excluded), it was found that the variable of long-term view and forecasting has great effect on the variable of Hoshin Kanri Planning ($r^2_{1.4}$=.758). The Anova table in Exhibit 6 confirms that this result is significant at the 5% level (p=.00). This shows that there is a little effect of employee improvement variable on the dependent variable.

CONCLUSION

Results depending on manufacturing/service companies that have received ISO 9001-9002 certificates from TSE, the Turkish Standards Institution, by the years 1998 and 1999 that are found through this study are as follows:

Depending on the results of the correlation analysis, in which the bivariate relationships between the variables are measured, positive and significant relationship between the variable of Hoshin Kanri Planning and the variables of being customer oriented, “my problem” point of view, long-term view and forecasting, being contingency-and-data-oriented, being product/service oriented, employee improvement, participation of all departments, applying the PDCA cycle, scientific and logical approach, creativity for producing new methodologies are found respectively.

When the regression analysis results were taken into consideration; it was found that the independent variable of long term view and forecasting has respectively great effect on the dependent variable of Hoshin Kanri Planning. It was also found that the variables of being contingency-and-data-oriented, participation of all departments, and applying the PDCA cycle had no effect, while the rest of the independent variables; creativity for producing new methodologies, "my problem" point of view, being product/service oriented, being customer oriented, scientific and logical approach, and employee improvement had a little effect on the dependent variable of Hoshin Kanri Planning.

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