PROBLEMS IMPLEMENTING JIT IN MAPLE PHARMACEUTICALS

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Abstract

The title of my project is "PROBLEMS IMPLEMENTING JIT IN MAPLE PHARMACEUTICALS." JIT or Just In Time is an inventory method in, which the objective is to produce goods just-in-time for use or sale. It is a Japanese manufacturing management method developed in the 1970's. Since then non-Japanese organizations have started implementing it. Initially it was developed for a defect free process, but overtime it came to incorporate the concept of having just enough inventories to get the work done. My project is about identifying problems that are causing difficulty in implementing JIT in Maple Pharmaceuticals because JIT can given them a competitive advantage.

Based on the literature reviews I found the two main problems with JIT implementation are suppliers and human resources. The hypothesis for my final project are H0: Non-supplier participation results in no long-term relation ship with a vendor, H1: Long-term vendor relationship is not possible because there is a lack of reliable suppliers & H3: JIT not a priority for some pharmaceuticals due to lack of knowledge/ training of management vis-à-vis workers.

The population I have chosen for my research project are the pharmaceutical organizations in the city of Karachi. These organizations have the resources to implement JIT. I have chosen around 5 organizations capable of implementing JIT. The population comes to around 1500. For my research project I used convenience sampling. Chi-Square testing was also used. Questionnaires were sent to the Supply Chain, Inventory, Purchasing and Production departments. 150 completed questionnaires in total were obtained on, which data analysis was performed.

The first and second hypotheses were accepted because the variables under discussion are independent of each other, which mean the null hypotheses were accepted. The third hypothesis was broken into management and workers. The management part of the hypothesis was not accepted because the variables under discussion were dependent on each other, which means the null hypothesis was rejected. The workers part of the hypothesis was accepted because the variables under discussion are independent of each other, which mean the null hypotheses were accepted.

My results were consistent with my initial hypotheses except for the management part of the third hypothesis, in which the null hypothesis was rejected. I can assume that management has the skills for JIT and it is a priority for them.

So in conclusion the first & second hypotheses were accepted, which means supplier participation is vital for JIT implementation. Without their cooperation JIT is not possible. The third hypothesis was broken down to two parts. One was for management and the other for the workers. The management hypothesis testing was not accepted indicating that management does not need that much training for JIT implementation. However the worker hypothesis was accepted indicating worker training is required for JIT implementation. This helped Maple Pharmaceuticals recognize two main problems, which can be solved based on their skill set. It must be solved in stages and will require patience, compromise and attrition.

Introduction

Pakistan has a very vibrant and forward-looking Pharma Industry. At the time of independence in 1947, there was hardly any pharma industry in the country. Today Pakistan has about 400 pharmaceutical manufacturing units including those operated by 25 multinationals present in the country. The Pakistan Pharmaceutical Industry meets around 70% of the country's demand of Finished Medicine. The domestic pharma market, in term of share market is almost evenly divided between the Nationals and the Multinationals.

The National pharma industry has shown a progressive growth over the years, particularly over the last one decade. The industry has invested substantially to upgrade itself in the last few years and today the majority industry is following Good Manufacturing Practices (GMP), in accordance with the domestic as well as international Guidance. Currently the industry has the capacity to manufacture a variety of product ranging from simple pills to sophisticated Biotech, Oncology and Value Added Generic compounds.

Although Pakistan 's pharmaceutical and healthcare sectors are expanding and evolving rapidly, about half the population has no access to modern medicines. Clearly this presents an opportunity, but much more work needs to be done by the government and industry's stakeholders. The value of pharmaceuticals sold in 2007 exceeded US$1.4bn, which equates to per capita consumption of less than US$ 10 per year and value of medicines sold is expected to exceed US$2.3 B by 2012.

Pakistan is a developing pharmaceutical market, with a large population and economic progress evident, but per capita drug spending was rather low at around US$9.30 in 2007. Private spending accounts for 65% of total healthcare expenditure sourced through out-of pocket payments, international aid and religious or charitable institutions. Pharmaceutical spending accounts for less than 1% of the country's GDP, comparable to levels in some neighboring countries but above that in some of the South Asian countries.

The forecast period is likely to witness the marginal strengthening of the generics sector, albeit more in terms of volumes than values. The share of generics is also likely to increase further as major drugs come off-patent in the near term, to the likely benefit of the generics-dominated local industry.

The Pakistan pharma industry is relatively young in the international markets with an export turnover of over US$ 100 Million as of 2007. Pakistan Pharma Industry boasts of quality producers and many units are approved by regulatory authorities all over the world. Like domestic market the sales in international market have gone almost double during last five years. The pharma industry is focusing to an Export Vision of USD 500 Million by 2013. In the meantime, exports are also likely to be boosted by new regional and global opportunities.

The Pakistan Pharmaceutical Industry is a success story, providing high quality essential drugs at affordable prices to Millions. Technologically, strong and self reliant National Pharmaceutical Industry is not only playing a key role in promoting and sustaining development in the vital field of medicine within the country, but is also well set to take on the international markets.

JIT or Just In Time is an inventory method in, which the objective is to produce goods just-in-time for use or sale. It is a Japanese manufacturing management method developed in the 1970's. Since then non-Japanese organizations have started implementing it. Initially it was developed for a defect free process, but overtime it came to incorporate the concept of having just enough inventories to get the work done.

JIT allows an increase in an organizations ability to compete with others and still remain relevant in the long run. It is able to do so because JIT develops a more optimal process for the organization. It also reduces production costs through increased efficiency within the production process; and it reduces waste of materials, time and effort. There are also other economic benefits such as lower inventory investment,

(Wilkinson 1989: Buffa 1984) and large space savings (Sage 1984); are among its visible outcomes. For example, General Motors reduced its inventory level by 17% within five years after applying a JIT Production System (Uribe 1986). In addition, JITPS has also enhanced the production flexibility and employee morale (Schonberg 1982; Buffa 1984).

By successfully implementing JIT an organization reduce if not eliminate high scrap, losing market shares, high levels of inventory, poor quality in products and labor, long lead times and the existence of many sources of waste in production processes (Salaheldin and Francis, 1998). However JIT implementation is not possible changing peoples attitudes and work habits.

Some of the pre-requisites of JIT are quick and economic setups (to allow small lot sizes) and a uniform production rate (to ensure schedule stability). These conditions are presented by several authors (e.g., Golhar and Stamm, 1991; Zhu et al., 1994; Ahmad et al., 2004; Schonberger, 2007), adding other elements such as a pull control system, flexible employees, preventive maintenance, upplier long-term relationships, and quality circles. Golhar and Stamm (1991), conducted an extensive literature review and identified four basic principles of the Just-in-Time management philosophy:
(i) elimination of waste,
(ii) employee involvement,
(iii) supplier long-term relationships, and
(iv) total quality control.

Literature Review

Successful implementation of JIT produces significant benefits for organizations like improving quality that consistently and continually meets customers requirements, minimizing levels of inventory and improving relationship with suppliers (Aghazadeh, 2003), reducing the labor turn over rate, reducing manufacturing lead times, reducing set-up time (Wafa and Yasin, 1998), reducing operations and materials handling costs & maximizing the use of space (Petersen, 2002).

JIT also improves on-time receipt of material from suppliers (Yasin et al., 2001), improving purchasing function, improving preventive maintenance, increasing worker participation, improving the quality and timing of received material, full utilization of people, equipment, materials and parts; & improving competition while reducing paper work (Arnold and Bernard, 1989; Crawford and Cox, 1991; Markham and McCart, 1995; Vuppalapati et al., 1995; Alternburg et al., 1999). Caution is needed because the arrival of materials must be accurate and continuous plus the use of backup inventories is necessary (Petersen, 2002).

Schermerhorn (1996) suggests that the effectiveness of JIT implementation hinges on high quality supplies, strong management commitment, a manageable supplier network, geographic concentration, efficient transportation and materials handling.

Lawrence and Lewis (1996) concluded in their study of the use of JIT practices in Mexico that JIT can be used successfully in some Mexican manufacturing firms. Furthermore, they found that there are three groups of obstacles that hinder the implementation of JIT in Mexican operations:
(1) Employee participation obstacles.
(2) Supplier participation obstacles.
(3) Obstacles to the managerial integration of the JIT companies.

Gyampah and Gargeya (2001) conducted a study on the implementation of just-in-time in manufacturing firms in Ghana. They found that JIT firms differ from non-JIT firms in terms of their efforts with set-up time reduction, continuous quality improvements, suppliers' partnership and employees' training. However, there is no significant difference with regard to the use of measurement systems.

Research shows that several modifications to existing systems should be undertaken prior to JIT implementation. First, is a modified approach by top management which may include modifications such as, designing an organization that integrates strategy

with people to achieve the basic premise of JIT, elimination of all types of waste, reducing specialization and organization functions, creating project teams, making everyone responsible for production of quality products and services, developing management and employees' commitment to continuous improvement (Theng, 1993; and Chong et al., 2001); & integrating people and organizational systems with hardware (Sim, 2001).

Second are engineering modifications that include changing work center layout, combining several operations to minimize the distance traveled, grouping machines in cells, purchasing equipment with short setup (Wafa and Yasin, 1998), responsibility for product design, quality and reliability, using design of experiments to improve quality while reducing costs, seeking product standardization wherever feasible, concentrating on continuous improvement in product design (Theng, 1993), using total productive maintenance (TPM) as an integral part of a JIT system (Bamber et al., 2000) & analyzing the operations in order to identify where standardization, simplifications and automation are needed (Yasin et al., 2001).

Third is modifying the material flow through changing inventory and order policies as well as production runs policies, reducing the number of vendors (Wafa and Yasin, 1998), stabilizing production schedules on a daily or weekly basis, planning production from final assembly, developing methods for estimating work-in-process and identifying why the company needs it and then trying to reduce it regularly (Theng, 1993), & establishing new procedures for dealing with suppliers like defining the criteria for suppliers based on quality, cost and timing (Yasin et al., 2001).

Fourthis that the implementation of JIT requires some human resource modification efforts including training employees to improve their job skills in technical matters and problems solving (Wafa and Yasin, 1998), changing from individual to group incentives that are related to JIT accomplishment, reducing job classifications, substituting multi-skilled jobs, increasing flexibility of work reassignment, plus ensuring the ability to work overtime to complete daily schedules (Theng, 1993), participation of employees in decision making (Ramarapu et al., 1995), training of management and employees to create an organizational culture consistent with the JIT philosophy (Jin et al., 1994) & building good relations with suppliers and improving communications between management and employees (Ramarapu et al., 1995; Yasin et al., 2001).

Works cited earlier by Celley et al. (1986); Klein (1988); Billesbach (1991); Jin et al. (1994); Mazany (1995); Wafa and Yasin (1998); and Yasin et al. (2001) have identified several human resources barriers that may hinder manufacturing companies implementing JIT philosophy successfully; such as, lack of formal training/education for management and workers; lack of communications between workers and management; management and employees resistance; a lack of support from top management; lack of company JIT expertise; lack of cooperation by suppliers to correctly supply materials on schedule; lack of support from production and material management; plus a lack of support from supervisors/foremen.

Hypothesis

H0: Non-supplier participation results in no long-term relation ship with a vendor.

H1: Long-term vendor relationship is not possible because there is a lack of reliable suppliers.

H2: JIT not a priority for some pharmaceuticals due to lack of knowledge/training of management vis-à-vis workers.

Methodology

Sampling

The population I have chosen for my research project are the pharmaceutical organizations in the city of Karachi. These organizations have the resources to implement JIT. I have chosen around 5 organizations capable of implementing JIT. The population comes to around 1500.

Methodologies, Assumptions & Procedures

For my research project I will be using convenience sampling.

Using percentage Method.

Data

n = ?
Z = 95% or 1.96
P = 25% or 0.25
E = 7% or 0.07

$$n = \frac{Z^2[P(1-P)]}{E^2}$$

$$n = \frac{1.96^2[0.25(1-0.25)]}{0.07^2}$$

$$n = \frac{3.8416[0.1875]}{0.0049}$$

$$n = \frac{3.8416[0.1875]}{0.0049}$$

n = 147

ANALYSIS

Hypothesis Intrepretation

HYPOTHESIS 0:

HO : Non-supplier participation results in no long-term relation ship with a vendor.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Reason 1) Non-supplier participation. * Reason 2) Lack of control of timing of overseas suppliers shipment.	150	100.0%	0	.0%	150	100.0%

Reason 1) Non-supplier participation. * Reason 2) Lack of control of timing of overseas suppliers shipment. Crosstabulation

			Reason 2) Lack of control of timing of overseas suppliers shipment.					
			Very Low Importance	Low Importance	Average Importance	High Importance	Very High Importance	Total
Reason 1) Non-supplier participation.	Very Low Importance	Count	3	8	5	3	2	21
		Expected Count	1.0	4.6	5.3	6.6	3.5	21.0
		% of Total	2.0%	5.3%	3.3%	2.0%	1.3%	14.0%
	Low Importance	Count	0	14	12	10	5	41
		Expected Count	1.9	9.0	10.4	12.8	6.8	41.0
		% of Total	.0%	9.3%	8.0%	6.7%	3.3%	27.3%
	Average Importance	Count	0	7	11	20	4	42
		Expected Count	2.0	9.2	10.6	13.2	7.0	42.0
		% of Total	.0%	4.7%	7.3%	13.3%	2.7%	28.0%
	High Importance	Count	3	3	7	12	14	39
		Expected Count	1.8	8.6	9.9	12.2	6.5	39.0
		% of Total	2.0%	2.0%	4.7%	8.0%	9.3%	26.0%
	Very High Importance	Count	1	1	3	2	0	7
		Expected Count	.3	1.5	1.8	2.2	1.2	7.0
		% of Total	.7%	.7%	2.0%	1.3%	.0%	4.7%
Total		Count	7	33	38	47	25	150
		Expected Count	7.0	33.0	38.0	47.0	25.0	150.0
		% of Total	4.7%	22.0%	25.3%	31.3%	16.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	40.139[a]	16	.001
Continuity Correction			
Likelihood Ratio	41.753	16	.000
Linear-by-Linear Association	9.249	1	.002
N of Valid Cases	150		

a. 11 cells (44.0%) have expected count less than 5. The minimum expected count is .33.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.517			.001
	Cramer's V	.259			.001
N of Valid Cases		150			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Interpretation:

The statistics discussed here are designed to analyze two nominal or dichotomous variables. Chi-square (X2) or phi/Cramer's V are good choices for statistics while analyzing two nominal variables.

Chi-square requires a relatively large sample size because the expected counts in 80% cells should be greater than 5. **Fisher's exact test** for 2x2 crosstabs should be reported instead of chi-square for small samples. Chi-square and the Fisher's exact test provide similar information about relationships among variables; however, they only tell us whether the relationship is statistically significant. They do not tell the effect size (i.e. the strength of the relationship).

Phi and **Cramer's V** provide a test of statistical significance and also provide information about the strength of the association between the two variables and can be used as a measure of the effect size. If there is a 2x2 cross tabulation, phi is the appropriate statistic. For larger crosstabs (larger than 2x2), Cramer's V is used.

Results:

Chi-square Tests table above is used to determine there is a statistically significant relationship between two dichotomous nominal variables. **Pearson Chi-Square** was used for small samples or **Fisher's Exact Test** was used to interpret the results of the test. They are statistically significant ($p < 0.05$), which indicates that the two variables under discussion are independent to each other and both of them are correlated or have an influence to each other.

The **Symmetric Measures** table as shown above provides the strength of relationship or effect size. The negative sign does not mean anything here because it shows the direction of the association or effect size of variable from variable to another. However, low values here indicate weak association.

So on the basis of above explanation and results output tables it is proven that Null Hypothesis is accepted which means that the relationship or association does not exist among the two variables but it is also a fact highlighted by the test results that the association however among them is weak to moderate.

HYPOTHESIS 1:

H0 : Long term vendor relationship is not possible because there is a lack of reliable suppliers.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Reason 3) Lack of reliable suppliers. * Reason 4) Not having a long-term reltionship with a vendor.	150	100.0%	0	.0%	150	100.0%

Reason 3) Lack of reliable suppliers. * Reason 4) Not having a long-term reltionship with a vendor. Crosstabulation

			Reason 4) Not having a long-term reltionship with a vendor.					
			Very Low Importance	Low Importance	Average Importance	High Importance	Very High Importance	Total
Reason 3) Lack of reliable suppliers.	Very Low Importance	Count	0	2	1	3	3	9
		Expected Count	.1	1.2	1.9	4.0	1.7	9.0
		% of Total	.0%	1.3%	.7%	2.0%	2.0%	6.0%
	Low Importance	Count	0	12	8	3	5	28
		Expected Count	.4	3.7	6.0	12.5	5.4	28.0
		% of Total	.0%	8.0%	5.3%	2.0%	3.3%	18.7%
	Average Importance	Count	0	2	14	32	3	51
		Expected Count	.7	6.8	10.9	22.8	9.9	51.0
		% of Total	.0%	1.3%	9.3%	21.3%	2.0%	34.0%
	High Importance	Count	2	3	9	23	18	55
		Expected Count	.7	7.3	11.7	24.6	10.6	55.0
		% of Total	1.3%	2.0%	6.0%	15.3%	12.0%	36.7%
	Very High Importance	Count	0	1	0	6	0	7
		Expected Count	.1	.9	1.5	3.1	1.4	7.0
		% of Total	.0%	.7%	.0%	4.0%	.0%	4.7%
Total		Count	2	20	32	67	29	150
		Expected Count	2.0	20.0	32.0	67.0	29.0	150.0
		% of Total	1.3%	13.3%	21.3%	44.7%	19.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.530[a]	16	.000
Continuity Correction			
Likelihood Ratio	60.118	16	.000
Linear-by-Linear Association	7.213	1	.007
N of Valid Cases	150		

a. 14 cells (56.0%) have expected count less than 5. The minimum expected count is .09.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.625			.000
	Cramer's V	.312			.000
N of Valid Cases		150			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Interpretation:

The statistics discussed here are designed to analyze two nominal or dichotomous variables. Chi-square (x^2) or phi/Cramer's *V* are good choices for statistics while analyzing two nominal variables.

Chi-square requires a relatively large sample size because the expected counts in 80% cells should be greater than 5. **Fisher's exact test** for 2x2 crosstabs should be reported instead of chi-square for small samples. Chi-square and the Fisher's exact test provide similar information about relationships among variables; however, they only tell us whether the relationship is statistically significant. They do not tell the effect size (i.e. the strength of the relationship).

Phi and **Cramer's** V provide a test of statistical significance and also provide information about the *strength* of the association between the two variables and can be used as a measure of the effect size. If there is a 2x2 cross tabulation, phi is the appropriate statistic. For larger crosstabs (larger than 2x2), Cramer's *V* is used.

Results:

Chi-square Tests table above is used to determine there is a statistically significant relationship between two dichotomous nominal variables. **Pearson Chi-Square** was used for small samples or **Fisher's Exact Test** was used to interpret the results of the test. They are statistically significant ($p < 0.05$), which indicates that the two variables under discussion are independent to each other and both of them are correlated or have an influence to each other.

The **Symmetric Measures** table as shown above provides the strength of relationship or effect size. The negative sign does not mean anything here because it shows the direction of the association or effect size of variable from variable to another. However, low values here indicate weak association.

So on the basis of above explanation and results output tables it is proven that Null Hypothesis is accepted which means that the relationship or association does not exist among the two variables but it is also a fact highlighted by the test results that the association however among them is weak to moderate.

HYPOTHESIS 2:

H0 : JIT not a priority for some pharmaceuticals due to lack of knowledge/training of management vis-à-vis workers.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Reason 6) Lack of formal training/education of management. * Reason 19) JIT not a priority.	150	100.0%	0	.0%	150	100.0%
Reason 13) Lack of formal training/education of workers. * Reason 19) JIT not a priority.	150	100.0%	0	.0%	150	100.0%

Reason 6) Lack of formal training/education of management.* Reason 19) JIT not a priority.

Crosstab

			Reason 19) JIT not a priority						Total
			0	Very Low Importance	Low Importance	Average Importance	High Importance	Very High Importance	
Reason 6) Lack of formal training/education of management.	Very Low Importance	Count	0	2	3	2	3	0	10
		Expected Count	.1	.9	2.9	2.3	2.7	1.1	10.0
		% of Total	.0%	1.3%	2.0%	1.3%	2.0%	.0%	6.7%
	Low Importance	Count	1	2	11	8	8	2	32
		Expected Count	.2	3.0	9.2	7.5	8.7	3.4	32.0
		% of Total	.7%	1.3%	7.3%	5.3%	5.3%	1.3%	21.3%
	Average Importance	Count	0	5	14	12	19	1	51
		Expected Count	.3	4.8	14.6	11.9	13.9	5.4	51.0
		% of Total	.0%	3.3%	9.3%	8.0%	12.7%	.7%	34.0%
	High Importance	Count	0	4	15	10	8	10	47
		Expected Count	.3	4.4	13.5	11.0	12.8	5.0	47.0
		% of Total	.0%	2.7%	10.0%	6.7%	5.3%	6.7%	31.3%
	Very High Importance	Count	0	1	0	3	3	3	10
		Expected Count	.1	.9	2.9	2.3	2.7	1.1	10.0
		% of Total	.0%	.7%	.0%	2.0%	2.0%	2.0%	6.7%
Total		Count	1	14	43	35	41	16	150
		Expected Count	1.0	14.0	43.0	35.0	41.0	16.0	150.0
		% of Total	.7%	9.3%	28.7%	23.3%	27.3%	10.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.603[a]	20	.147
Continuity Correction			
Likelihood Ratio	29.418	20	.080
Linear-by-Linear Association	4.866	1	.027
N of Valid Cases	150		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .07.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.421			.147
	Cramer's V	.211			.147
N of Valid Cases		150			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Interpretation:

The statistics discussed here are designed to analyze two nominal or dichotomous variables. Chi-square ($\div^2$) or phi/Cramer's V are good choices for statistics while analyzing two nominal variables.

Chi-square requires a relatively large sample size because the expected counts in 80% cells should be greater than 5. **Fisher's exact test** for 2x2 crosstabs should be reported instead of chi-square for small samples. Chi-square and the Fisher's exact test provide similar information about relationships among variables; however, they only tell us whether the relationship is statistically significant. They do not tell the effect size (i.e. the strength of the relationship).

Phi and **Cramer's** V provide a test of statistical significance and also provide information about the *strength* of the association between the two variables and can be used as a measure of the effect size. If there is a 2x2 cross tabulation, phi is the appropriate statistic. For larger crosstabs (larger than 2x2), Cramer's V is used.

Results:

Chi-square Tests table above is used to determine there is a statistically significant relationship between two dichotomous nominal variables. **Pearson Chi-Square** was used for small samples or **Fisher's Exact Test** was used to interpret the results of the test. They are not statistically significant ($p > 0.05$), which indicates that the two variables under discussion are not independent to each other and both of them are correlated or have an influence to each other.

The **Symmetric Measures** table as shown above provides the strength of relationship or effect size. The negative sign does not mean anything here because it shows the direction of the association or effect size of variable from variable to another. However, low values here indicate weak association.

So on the basis of above explanation and results output tables it is proven that Null Hypothesis is rejected which means that the relationship or association does exist among the two variables but it is also a fact highlighted by the test results that the association however among them is weak to moderate.

Reason 13) Lack of formal training/education of workers. * Reason 19) JIT not a priority.

Crosstab

			Reason 19) JIT not a priority.						
			0	Very Low Importance	Low Importance	Average Importance	High Importance	Very High Importance	Total
Reason 13) Lack of formal training/education of workers.	Very Low Importance	Count	0	0	3	2	1	1	7
		Expected Coun	.0	.7	2.0	1.6	1.9	.7	7.0
		% of Total	.0%	.0%	2.0%	1.3%	.7%	.7%	4.7%
	Low Importance	Count	0	4	10	13	6	0	33
		Expected Coun	.2	3.1	9.5	7.7	9.0	3.5	33.0
		% of Total	.0%	2.7%	6.7%	8.7%	4.0%	.0%	22.0%
	Average Importance	Count	0	4	15	13	9	6	47
		Expected Coun	.3	4.4	13.5	11.0	12.8	5.0	47.0
		% of Total	.0%	2.7%	10.0%	8.7%	6.0%	4.0%	31.3%
	High Importance	Count	1	2	12	5	23	6	49
		Expected Coun	.3	4.6	14.0	11.4	13.4	5.2	49.0
		% of Total	.7%	1.3%	8.0%	3.3%	15.3%	4.0%	32.7%
	Very High Importance	Count	0	4	3	2	2	3	14
		Expected Coun	.1	1.3	4.0	3.3	3.8	1.5	14.0
		% of Total	.0%	2.7%	2.0%	1.3%	1.3%	2.0%	9.3%
Total		Count	1	14	43	35	41	16	150
		Expected Coun	1.0	14.0	43.0	35.0	41.0	16.0	150.0
		% of Total	.7%	9.3%	28.7%	23.3%	27.3%	10.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.287[a]	20	.019
Continuity Correction			
Likelihood Ratio	37.331	20	.011
Linear-by-Linear Association	2.155	1	.142
N of Valid Cases	150		

a. 19 cells (63.3%) have expected count less than 5. The minimum expected count is .05.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.485			.019
	Cramer's V	.243			.019
N of Valid Cases		150			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Interpretation:

The statistics discussed here are designed to analyze two nominal or dichotomous variables. Chi-square ($\div^2$) or phi/Cramer's V are good choices for statistics while analyzing two nominal variables.

Chi-square requires a relatively large sample size because the expected counts in 80% cells should be greater than 5. **Fisher's exact test** for 2x2 crosstabs should be reported instead of chi-square for small samples. Chi-square and the Fisher's exact test provide similar information about relationships among variables; however, they only tell us whether the relationship is statistically significant. They do not tell the effect size (i.e. the strength of the relationship).

Phi and **Cramer's** V provide a test of statistical significance and also provide information about the *strength* of the association between the two variables and can be used as a measure of the effect size. If there is a 2x2 cross tabulation, phi is the appropriate statistic. For larger crosstabs (larger than 2x2), Cramer's V is used.

Results:

Chi-square Tests table above is used to determine there is a statistically significant relationship between two dichotomous nominal variables. **Pearson Chi-Square** was used for small samples or **Fisher's Exact Test** was used to interpret the results of the test. They are statistically significant ($p < 0.05$), which indicates that the two variables under discussion are independent to each other and both of them are correlated or have an influence to each other.

The **Symmetric Measures** table as shown above provides the strength of relationship or effect size. The negative sign does not mean anything here because it shows the direction of the association or effect size of variable from variable to another. However, low values here indicate weak association.

So on the basis of above explanation and results output tables it is proven that Null Hypothesis is accepted which means that the relationship or association does not exist among the two variables but it is also a fact highlighted by the test results that the association however among them is weak to moderate.

CORRESPODENCE ANALYSIS

Credit

CORRESPONDENCE
Version 1.1
by
Data Theory Scaling System Group (DTSS)
Faculty of Social and Behavioral Sciences
Leiden University, The Netherlands

Correspondence Table

	trans1					
Index1	1	2	3	4	5	Active Margin
1	2186	3136	2616	2930	457	11325
2	557	2324	3129	3277	2038	11325
3	610	1452	3972	4468	823	11325
4	232	1263	2514	5006	2310	11325
5	740	1951	3361	3662	1611	11325
6	765	2483	3276	3865	936	11325
7	840	2417	3012	4316	740	11325
8	892	2340	2541	3396	2156	11325
9	1316	2455	3153	3680	721	11325
10	624	3754	2589	3411	947	11325
11	1177	2867	3232	3106	943	11325
12	773	2420	4035	2914	1183	11325
13	689	2094	3119	4038	1385	11325
14	753	2418	2947	3536	1532	11186
15	787	2778	2903	3542	1315	11325
16	1123	3072	3667	2807	656	11325
17	279	2748	3105	3831	1362	11325
18	548	3196	2431	3073	2077	11325
19	1226	3172	2244	3220	1449	11311
Active Margin	16117	48340	57846	68078	24641	215022

Row Profiles

Index1	trans1					
	1	2	3	4	5	Active Margin
1	.193	.277	.231	.259	.040	1.000
2	.049	.205	.276	.289	.180	1.000
3	.054	.128	.351	.395	.073	1.000
4	.020	.112	.222	.442	.204	1.000
5	.065	.172	.297	.323	.142	1.000
6	.068	.219	.289	.341	.083	1.000
7	.074	.213	.266	.381	.065	1.000
8	.079	.207	.224	.300	.190	1.000
9	.116	.217	.278	.325	.064	1.000
10	.055	.331	.229	.301	.084	1.000
11	.104	.253	.285	.274	.083	1.000
12	.068	.214	.356	.257	.104	1.000
13	.061	.185	.275	.357	.122	1.000
14	.067	.216	.263	.316	.137	1.000
15	.069	.245	.256	.313	.116	1.000
16	.099	.271	.324	.248	.058	1.000
17	.025	.243	.274	.338	.120	1.000
18	.048	.282	.215	.271	.183	1.000
19	.108	.280	.198	.285	.128	1.000
Mass	.075	.225	.269	.317	.115	

Summary

Dimension	Singular Value	Inertia	Proportion of Inertia		Confidence Singular Value	
			Accounted for	Cumulative	Standard Deviation	Correlation 2
1	.164	.027	.509	.509	.001	.026
2	.122	.015	.278	.786	.001	
3	.084	.007	.132	.919		
4	.066	.004	.081	1.000		
Total		.053	1.000	1.000		

Overview Row Points[a]

Index1	Mass	Score in Dimension 1	Score in Dimension 2	Inertia	Contribution: Of Point to Inertia of Dimension 1	Contribution: Of Point to Inertia of Dimension 2	Contribution: Of Dimension to Inertia of Point 1	Contribution: Of Dimension to Inertia of Point 2	Contribution: Of Dimension to Inertia of Point Total
1	.053	-.758	.160	.007	.184	.011	.701	.023	.724
2	.053	.159	-.266	.002	.008	.031	.136	.280	.415
3	.053	.591	.725	.006	.112	.228	.473	.526	.999
4	.053	1.058	-.359	.011	.358	.056	.881	.075	.956
5	.053	.291	.083	.001	.027	.003	.628	.038	.666
6	.053	.062	.242	.001	.001	.025	.060	.670	.730
7	.053	.155	.264	.002	.008	.030	.117	.252	.369
8	.053	.126	-.492	.002	.005	.105	.063	.701	.764
9	.053	-.117	.325	.001	.004	.046	.100	.569	.669
10	.053	-.465	-.255	.004	.069	.028	.486	.108	.595
11	.053	-.345	.157	.001	.038	.011	.834	.128	.962
12	.053	-.118	.382	.003	.004	.063	.040	.310	.350
13	.053	.315	.076	.001	.032	.002	.932	.040	.972
14	.053	.083	-.112	.000	.002	.005	.346	.474	.820
15	.053	-.077	-.104	.000	.002	.005	.311	.422	.733
16	.053	-.515	.373	.004	.085	.060	.637	.247	.884
17	.053	.118	-.074	.001	.004	.002	.135	.040	.175
18	.053	-.191	-.688	.004	.012	.205	.087	.836	.923
19	.053	-.371	-.438	.003	.044	.083	.435	.448	.883
Active Total	1.000			.053	1.000	1.000			

a. Symmetrical normalization

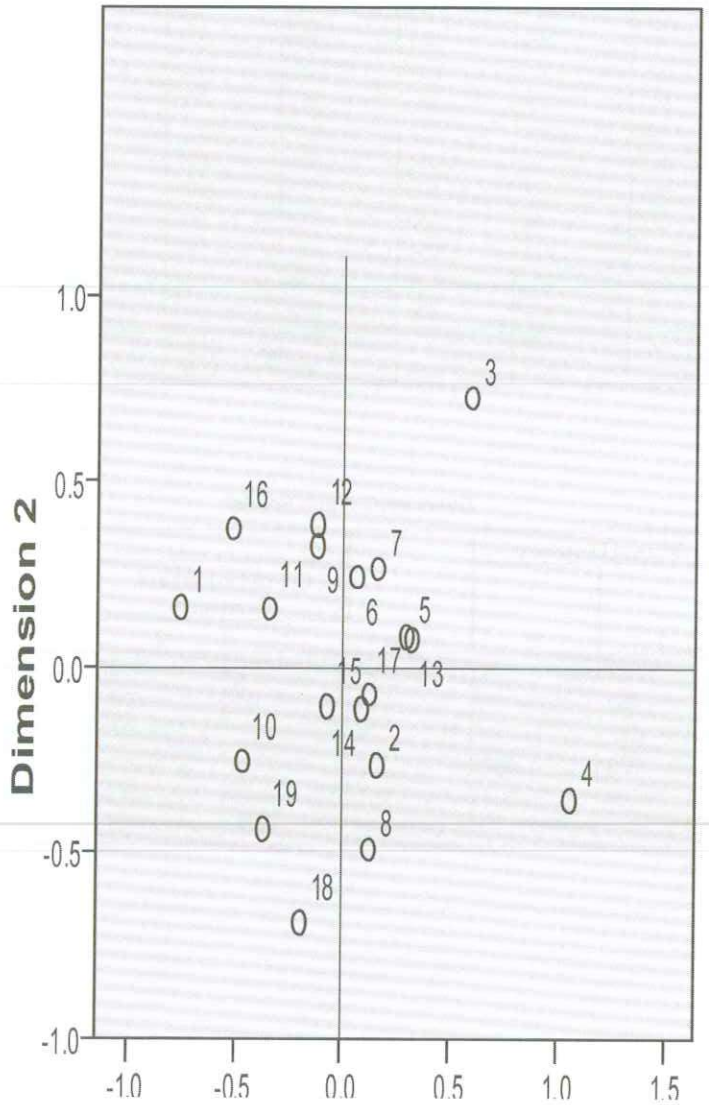
Overview Column Points[a]

trans1	Mass	Score in Dimension 1	Score in Dimension 2	Inertia	Contribution: Of Point to Inertia of Dimension 1	Contribution: Of Point to Inertia of Dimension 2	Contribution: Of Dimension to Inertia of Point 1	Contribution: Of Dimension to Inertia of Point 2	Contribution: Of Dimension to Inertia of Point Total
1	.200	-.323	.136	.007	.127	.030	.494	.064	.558
2	.200	-.584	-.211	.014	.414	.073	.821	.079	.900
3	.200	.072	.513	.009	.006	.432	.019	.705	.724
4	.200	.526	.087	.012	.337	.012	.744	.015	.759
5	.200	.308	-.524	.011	.116	.452	.277	.591	.869
Active Total	1.000			.053	1.000	1.000			

a. Symmetrical normalization

Row Points for Index1

Symmetrical Normalization



Conclusions

Management Research contributes to knowledge in the field of management. It also looks for solutions to management problems. Market research is also included in this as well as being a part of business strategy. It is one of the tools used by industries to gain a benefit.

Given that Maple Pharmaceuticals (Pvt) Ltd is an up and coming company, it is looking for a competitive advantage in order to compete with the established pharmaceuticals organizations. For this purpose they decided to implement JIT. As we all know 1/3 of investment is tied in inventory, JIT allows those funds to be freed up and used for productive purposes. In the case of a pharmaceutical organization those funds can be used for R&D, infrastructure, HR, new equipment etc.

However before JIT can be implemented we must identify the problems that exist with respect to implementing JIT. Two main problems have been identified in this respect. These are suppliers and human resource training. Three hypotheses were created and tested.

The first & second hypotheses were accepted, which means supplier participation is vital for JIT implementation. Without their cooperation JIT is not possible. The third hypothesis was broken down to two parts. One was for management and the other for the workers. The management hypothesis testing was not accepted indicating that management does not need that much training for JIT implementation. However the worker hypothesis was accepted indicating worker training is required for JIT implementation.

The external forces and the external environment that exists cannot be controlled, but supplier collaboration and JIT training is possible. The scope of my final project is to identify problems implementing JIT due to the time constraints present. If Maple pharmaceuticals requires solutions to the problems identified than I am willing to work with them on it.

Once the problems have been identified Maple Pharmaceuticals can begin finding solutions. Once JIT has been implemented the first advantage will be increased sales as a result of lower production costs due to JIT implementation. This will make their products more successful, best price can be set for the products. Besides this you can also find out what products are being purchased and consumed by your customers.

The second advantage will be business growth. By reducing cost more money and resources can be invested in activities that lead to business growth. Business growth is necessary in today's highly competitive world because an organization cannot survive without business growth.

The third and the most important advantage is customer satisfaction. The final objective of Supply Chain Management is customer satisfaction. By reducing cost via JIT the price of products go down, which is one of the things that lead to customer satisfaction.

In conclusion management research helped Maple Pharmaceuticals recognize the two main problems with regards to JIT implementation. Both the problems can be solved, but it depends on their skill set. The problems must be solved in stages because it cannot be solved in one go. It will require patience, compromise and attrition.

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