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Success of Marketing Information System Model for SMEs of Punjab: Validation of Survey Based Results and Case Study Analysis

Rahul Hakhu[a],*, Dr. Ravi Kiran[b], Dr. D.P.Goyal[a,b]

[a] Rayat Institute of Management, RailMajra, District.S.B.S. Nagar, Punjab-144533, INDIA
[b] School of Behavioural Sciences and Business Studies, Patiala, Punjab-147004, INDIA
[a,b] Management Development Institute, Gurgaon-122007, INDIA

Abstract

The study uses a survey analysis for 140 SMEs of manufacturing sector of Punjab in India to understand the level of MkIS by firms. Punjab has been ranked as one of the growing states of India. The study uses step-wise regression technique to find the important predictors of the MkIS model. The results depict that co-efficient of determination is 0.508 and adjusted co-efficient of determination is 0.490, these predictors explain 49% of the variation and Durbin-Watson index is 2.102, which is acceptable for the model. The main objective of the study is to validate the success of MkIS model for SMEs through a case study done for six firms of which 2 firms produce cutting tools from district Patiala, 2 firms producing sports goods from district Jalandhar and 2 firms producing bicycle components from district Ludhiana respectively.

Keywords: Marketing Information System (MkIS); SMEs, Punjab manufacturing; Important Predictors of MkIS.

1. Introduction

Marketing Information System (MkIS) is a set of procedures and methods designed to generate, analyze, disseminate, and store anticipated marketing decision information on a regular, continuous basis. An information system can be used operationally, managerially, and strategically for several aspects of marketing. MkIS also provides methods for interpreting the information it provides. With a proper MkIS in place, the complete organization can be tracked which can be used to analyse independent processes. This helps in establishing a broader perspective which helps to know which steps can be taken to facilitate improvement. MkIS is critical for planning. No organization can do planning without information. For planning, the first thing which is needed is

* Corresponding author. Tel.: +91 9988094554.
E-mail address: rahulhakhu@yahoo.com

the organizations capabilities, then the business environment and finally competitor analysis. In a proper MkIS, all these are present by default and are continuously updated. Thus MkIS is very important for planning and analysis. MkIS are mostly applied by large and dominant firms, but it is right time now for SMEs to focus on the MkIS and initiate steps to enhance information technology culture in SMEs of Punjab manufacturing. The present study has been taken against the above backdrop for MkIS of manufacturing SMEs of Punjab in India.

On the basis of literature the following five predictors have been identified as independent variables. These are:

1.1 Design characteristics of MkIS:

As per (Piercy and Evans, 1983), (Little, 1979) and (Milis, 2008) design characteristics deals with information. Design characteristics cover the following:

    a. Broad scope information. (DC1)
    b. Timely information. (DC2)
    c. Accurate information. (DC3)
    d. Current information. (DC4)
    e. Aggregated information. (DC5)

1.2 Capabilities of MkIS:

According to (Knuckles, 1987) and (Fleisher *et al.,* 2008), the broad capabilities of MkIS range from providing data to decision support system for sophisticated analysis of data. These capabilities are highlighted as:

    a. It simply provides data on which decisions are made. (CA1)
    b. It has the capability to undertake simple analysis of the data and from this provides information on which decisions are made. (CA2)
    c. It provides sophisticated analysis of data, and therefore provides invaluable decision support information. (CA3)
    d. It provides sophisticated analysis of data and has the ability to make recommendations, if so required, as an aid to decision making. (CA4)

1.3 Primary characteristics of MkIS:

According to (Bhagwat and Sharma, 2007) Primary characteristics of MkIS are considered as a major tool to help companies provide a competitive edge in the era of globalization. As per (Murray *et al.,* 2004) primary characteristic covers the basic tools for MkIS and highlighted as :

    a. Windows 98 & Windows XP as Operating system. (PC1)
    b. E-Mails & Search Engines as Internet (PC2)
    c. Word, Excel & PowerPoint as Applications. (PC3)
    d. Timely information of marketing needs. (PC4)
    e. Stores marketing information. (PC5)
    f. Processed information maintained in the data-base. (PC6)

1.4 Hindrance factors of MkIS:

For success of MkIS it is essential to identify the factors that can deter its progress. It is essential to deal with them properly, so that they cannot act as impediment. As per (Sisodia, 1992) tackling hindrance factors of MkIS is in fact very important. Infact, system implementation success factors is not just use of Technology. According to Thatcher and (Thatcher and Oliver, 2001) problems are the result of the interaction between characteristics of the people being asked to adopt the system and characteristics of the system itself. The hindrance factors covered are:

    a. Not as an information processing system. (HF1)
    b. Can solve all management problems. (HF2)
    c. Lack of training. (HF3)
    d. Adequate attention not given. (HF4)
    e. Impersonal system. (HF5)
    f. Does not give perfect information. (HF6)
    g. Under estimating. (HF7)

1.5 MkIS sophistication:

As per (Van Nievelt, 1984) and (Martin, 2004) sophistication covers the marketing needs for meeting customer requirements and also for formulating of the strategic plan for effective marketing decision. The MkIS sophistication covered in the study are:

    a. Strategic perspective.(SO1)
    b. Meeting customer needs. (SO2)
    c. Threat. (SO3)
    d. Strategic planning. (SO4)
    e. IT budget. (SO5)
    f. Marketing decision. (SO6)

2. Research Methodology

The present study has been based on a survey analysis conducted in the state of Punjab, one of the growing states of Indian economy. Data has been collected through a self-structured questionnaire from 140 manufacturing industries which include 124 small and 16 medium enterprises respectively of Punjab from the following districts: Patiala for cutting tools (30 units), Jalandhar for sports goods (50 units) and Ludhiana for bicycle components (60 units). Reason for selecting these districts is due to the 82 per cent exports of total exports from these districts of Punjab and they have prominent range of product. Cutting tools from Patiala, sports goods from Jalandhar and bicycle components from Ludhiana compromises nearly 15 per cent of total exports from Punjab and provides 75 percent of the country's requirement.

The survey was tested for reliability and overall reliability score (Cronbach Alpha) of the questionnaire has been 0.902. Face and content validity have been done. The questionnaire had been validated by the peers and has a validation score 3.75 on a scale of five. Some questions were reframed. Table 1, describes the details of the reliability statistics. The data so gathered analysed using SPSS ver.19. The questionnaire has five sections viz. i) Primary characteristics (usage of computers), ii) Design characteristics/ Capabilities/ Marketing mix/ Sophistication of MkIS, iii) Success factors of MkIS, iv) Hindrance factors of MkIS and v) Organizational performance. The reliability score of all the four sections ranged between 0.710 and 0. 829.

Table 1	**Reliability Statistics**	
Items	No of Items	Cronbach Alpha
Primary Characteristics(Usage of Computers)	11	.829
Design Characteristics/ Capabilities/Marketing Mix/ Sophistication of MkIS	19	.792
Success Factors of MkIS	07	.710
Hindrance Factors of MkIS	07	.807
Organizations Performance	06	.729
Overall	50	.902

2.1 Objectives of the study:

- To identify the predictors for the development of MkIS model for the selected manufacturing SMEs of Punjab.
- To develop a model for the MkIS in the selected SMEs of Punjab.
- To validate the survey based results and case study analysis.

2.2 Hypothesis related with the study are:

H1: Design Characteristics of MkIS are positively associated with success factors of MkIS Model.
H2: Capabilities of MkIS are positively associated with success factors of MkIS Model.
H3: Primary Characteristics of MkIS are positively associated with success factors of MkIS Model.
H4: Hindrance Factors of MkIS are negatively associated with success of MkIS Model.
H5: MkIS Sophistication is positively associated with success factors of MkIS Model.

3. Data analysis and Discussion

3.1 Survey based results:

Data has been collected through a self-structured questionnaire from 140 manufacturing industries of Punjab.

3.1.1 Design characteristics of MkIS:

Table 2   **Design Characteristics of MkIS**

Nature of Firm		DC1	DC2	DC3	DC4	DC5
Cutting Tools	Mean	3.20	3.33	3.53	3.10	3.30
	N	30	30	30	30	30
	SD	1.27	0.99	1.13	1.06	0.98
Sports Goods	Mean	3.14	3.32	3.30	3.10	2.98
	N	50	50	50	50	50
	SD	1.24	1.26	1.05	1.35	1.31
Bicycle Components	Mean	3.05	3.38	3.40	3.43	3.26
	N	60	60	60	60	60
	SD	1.01	1.20	0.94	.88	1.07
Total	Mean	3.11	3.35	3.39	3.24	3.17
	N	140	140	140	140	140
	SD	1.15	1.18	1.02	1.11	1.15

As per Table 2, From sector- wise analysis it is evident that all three sectors, i.e., cutting tools, sports goods and bicycle components have given high priority to Accurate information and Timely information.

3.1.2 Capabilities of MkIS:

Table 3   **Capabilities of MkIS**

Nature of Firm		CA1	CA2	CA3	CA4
Cutting Tools	Mean	3.43	3.36	3.86	3.56
	N	30	30	30	30
	SD	1.07	1.09	77	0.81
Sports Goods	Mean	3.30	3.30	3.54	3.76
	N	50	50	50	50
	SD	1.18	1.18	0.93	1.02
Bicycle Components	Mean	3.21	3.58	3.50	3.80
	N	60	60	60	60
	SD	1.00	0.99	0.89	0.91
Total	Mean	3.29	3.43	3.59	3.73
	N	140	140	140	140
	SD	1.08	1.08	0.88	0.93

As per Table 3, overall results indicate that in all three sectors, i.e., cutting tools, sports goods and bicycle components respectively have given highest rating to sophisticated analysis of data, which has an ability to make recommendations as an aid to decision making followed by that it provides invaluable decision support information.

3.1.3 Primary characteristics of MkIS:

Table 4   **Primary Characteristics of MkIS**

Nature of Firm		PC1		PC2		PC3		PC4	PC5	PC6
Cutting Tools	Mean	3.43	3.10	3.83	2.83	3.43	3.30	2.80	3.23	3.26	3.26
	N	30	30	30	30	30	30	30	30	30	30
	SD	0.67	0.92	0.74	0.83	1.04	0.65	0.80	1.27	0.98	0.82
Sports Goods	Mean	3.52	2.66	3.46	2.54	3.14	2.82	2.56	3.00	3.02	3.36
	N	50	50	50	50	50	50	50	50	50	50
	SD	0.64	0.71	0.61	0.61	0.60	0.74	0.61	1.42	1.40	0.92
Bicycle Components	Mean	3.56	2.75	3.48	2.40	3.23	2.88	2.41	3.05	3.20	3.51
	N	60	60	60	60	60	60	60	60	60	60
	SD	0.56	0.75	0.62	0.64	0.53	0.64	0.67	1.39	1.02	0.81
Total	Mean	3.52	2.79	3.55	2.54	3.24	2.95	2.55	3.07	3.15	3.41
	N	140	140	140	140	140	140	140	140	140	140
	SD	0.61	0.79	0.66	0.69	0.69	0.70	0.69	1.37	1.16	0.85

As per Table 4, Email as an Internet has highest usage in all the three sectors, i.e., cutting tools, sports goods and bicycle components. Also processed information (e.g., sales forecasts, market share, distribution trend, etc.) maintained in the database has a good preference amongst the three sectors.

3.1.4 Hindrance factors of MkIS:

Table 5   **Hindrance Factors of MkIS**

Nature of Firm		HF1	HF2	HF3	HF4	HF5	HF6	HF7
Cutting	Mean	3.16	3.53	2.56	1.93	2.83	2.83	2.83
Tools	N	30	30	30	30	30	30	30
	SD	1.17	0.81	0.85	0.69	1.05	0.83	0.98
Sports	Mean	3.28	3.42	3.10	2.08	3.34	3.18	3.06
Goods	N	50	50	50	50	50	50	50
	SD	1.14	0.97	1.21	1.06	0.96	1.18	1.09
Bicycle	Mean	3.56	3.45	2.78	2.53	3.01	2.60	2.58
Components	N	60	60	60	60	60	60	60
	SD	0.94	0.94	1.30	1.22	0.96	0.90	0.96
	Mean	3.37	3.45	2.85	2.24	3.09	2.85	2.80
Total	N	140	140	140	140	140	140	140
	SD	1.07	0.92	1.19	1.09	0.99	1.02	1.03

As per Table 5, all the obstacles are having a little higher mean score and hence deserve attention but in terms of individual factor the highest belief in all the three sectors, i.e., cutting tools, sports goods and bicycle components is that the computerized MkIS can solve all the management problems of planning and control of the business followed by that it is not as an information processing system.

3.1.5 MkIS Sophistication:

Table 6   **MkIS Sophistication**

Nature of Firm		SO1	SO2	SO3	SO4	SO5	SO6
Cutting	Mean	3.30	3.70	3.03	3.30	2.93	3.26
Tools	N	30	30	30	30	30	30
	SD	0.91	0.74	0.99	0.87	1.04	0.94
Sports	Mean	2.86	3.60	3.44	3.26	3.18	3.06
Goods	N	50	50	50	50	50	50
	SD	1.16	0.83	1.09	1.10	1.24	1.09
Bicycle	Mean	2.96	3.51	3.53	3.18	3.21	3.10
Components	N	60	60	60	60	60	60
	SD	0.97	0.89	1.04	0.85	1.02	1.03
	Mean	3.00	3.58	3.39	3.23	3.14	3.12
Total	N	140	140	140	140	140	140
	SD	1.03	0.83	1.06	0.94	1.10	1.03

As per Table 6, all the factors in all the three sectors, i.e., cutting tools, sports goods and bicycle components are having a little higher mean but the meeting customer needs has the highest priority followed by threat to new entrants.

3.2 MkIS (Marketing Information System) Model:

Table 7   **Marketing Information System Model**

Predictors	B	Std Error	Beta	T	P
(Constant)	1.624	0.398		4.077	.001***
Des Characteristics	0.148	0.054	0.219	2.708	.008**
Capabilities	0.128	0.053	0.189	2.427	.017**
Primary Characteristics	0.223	0.073	0.196	3.036	.003**
Hindrance Factors	-0.176	0.06	-0.214	-2.956	.004**
Sophistications	0.171	0.083	0.168	2.063	.041*

*** $p < .001$; ** $p < .01$; and * $p < .05$

As per Table 7,

The results of regression highlight that the value of B for Design Characteristics of MkIS is positive and is 0.148, thus the hypothesis H_1: *Design Characteristics of MkIS are positively associated with success factors of MkIS Model* has been accepted.

Regarding Capabilities of MkIS the value of B is 0.128, and it is positively related with Success Factors of MkIS. Thus the hypothesis H_2: *Capabilities of MkIS are positively associated with success factors of MkIS Model* has also been accepted.

Regarding Primary Characteristics of MkIS the value is 0 .223, it is positively associated with   success factors of MkIS. *Hence,* the hypothesis H_3: *Primary Characteristics of MkIS are positively associated with success factors of MkIS Model* has been accepted.

Regarding Hindrance factors as expected the value is negative and is -0.176, thus the hypothesis H_4: *Hindrance Factors of MkIS are negatively associated with success factors of MkIS Model* has also been accepted.

In case of MkIS Sophistication the value of B is positive and is 0.171, thus the hypothesis H_5: *MkIS Sophistication are positively associated with success factors of MkIS Model* has been accepted.

Table 8   **MkIS (Marketing Information System) Regression Model**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.575a	0.33	0.32	0.25	0.33	68.33	1	138	-	
2	.641b	0.41	0.40	0.23	0.07	18.43	1	137	0.000	
3	.676c	0.45	0.44	0.23	0.04	11.47	1	136	0.001	2.102
4	.702d	0.49	0.47	0.22	0.03	9.68	1	135	0.002	
5	.713e	0.50	0.49	0.22	0.01	4.25	1	134	0.041	

*** $p<.001$; ** $p<.01$; and * $p < .05$
Design Characteristics[a] , Capabilities[b] , Primary Characteristics[c] , Hindrance Factors[d], Sophistications[e]

The regression model results are highlighted through Table 8. The value of co-relation is .713, co-efficient of determination is 0 .508 and adjusted co-efficient of determination is 0.490, these variables explain 49% of the variation and Durbin-Watson index is 2.102, which is acceptable for the model. The ANOVA results are also significant, which depict the overall significance of the model. Moreover the results of step wise regression depict that value of R^2 has improved from 0.331 to 0.508 with the introduction of all variables. That means the model can include all these factors as the predicting power has improved from 32.6 to 49 percent. Thus the results verify that success factors of MkIS are positively associated with Design Characteristics, Capabilities, Primary Characteristics and Sophistication. Regarding predicting power Primary Characteristics and Sophistication have higher value of 'B' and are relatively more important than other predictors.

3.3 Case-study validation of results:

Case study validation has been done for six firms of which 2 firms producing cutting tools from district Patiala, 2 firms producing sports goods from district Jalandhar and 2 firms producing bicycle components from district Ludhiana respectively.

3.3.1 MkIS Design characteristics – Study of 6 Manufacturing firms:

Table 9   **MkIS Design Characteristics – Study of 6 Manufacturing Firms**

Design Characteristics	F1	F2	F3	F4	F5	F6	Total of 6 Firms	Average of 6 Firms	Rank
DC1	5	5	3	2	2	4	21	3.5	3
DC2	4	4	3	5	3	5	24	4	1
DC3	5	4	4	3	3	4	23	3.83	2
DC4	5	3	3	4	4	2	21	3.5	3
DC5	4	3	4	1	5	3	20	3.33	4

As per the Table 9, importance accorded by the firms to different initiatives in context to MkIS Design characteristics with the highest priority is Timely information and followed by Accurate information in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively.

3.3.2 Capabilities of MkIS – Study of 6 Manufacturing firms:

Table 10   Capabilities of MkIS – Study of 6 Manufacturing Firms

Capabilities of MkIS	F1	F2	F3	F4	F5	F6	Total of 6 Firms	Average of 6 Firms	Rank
CA1	4	4	3	5	2	4	22	3.66	3
CA2	4	3	4	1	3	5	20	3.33	4
CA3	5	5	4	3	4	4	25	4.16	1
CA4	4	4	5	4	3	4	24	4	2

As per the Table 10, importance accorded by the firms to different initiatives in context to Capabilities of MkIS with the highest priority is that it provides sophisticated analysis of data, and therefore provides invaluable decision support information and followed by that it has the ability to make recommendations, if so required, as an aid to decision making in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively.

3.3.3 Primary characteristics of MkIS – Study of 6 Manufacturing firms:

Table 11   Primary Characteristics of MkIS – Study of 6 Manufacturing Firms

Primary Characteristics	F1	F2	F3	F4	F5	F6	Total of 6 Firms	Average of 6 Firms	Rank
PC1	2	3	3	4	4	4	20	3.33	3
	2	2	2	2	3	3	14	2.33	6
PC2	4	4	4	3	4	3	22	3.66	1
	4	4	3	4	2	2	19	3.16	4
PC3	4	4	3	4	2	2	19	3.16	4
	4	3	2	3	3	3	18	3	5
	4	3	3	3	4	2	19	3.16	4
PC4	4	4	2	4	4	2	20	3.33	3
PC5	2	3	4	5	1	4	19	3.16	4
PC6	4	4	4	3	3	3	21	3.5	2

As per the Table 11, importance accorded by the firms to different initiatives in context to Primary characteristics of MkIS with the highest priority is that of Emails of internet and followed by processed information which is maintained in the database in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively.

3.3.4 Hindrance factors of MkIS – Study of 6 Manufacturing firms:

Table 12   Hindrance Factors of MkIS – Study of 6 Manufacturing Firms

Hindrance Factors of MkIS	F1	F2	F3	F4	F5	F6	Total of 6 Firms	Average of 6 Firms	Rank
HF1	3	2	3	3	3	5	19	3.16	2
HF2	4	3	3	5	4	5	24	4	1
HF3	1	2	2	2	5	2	14	2.33	5
HF4	2	3	2	1	5	2	15	2.5	4
HF5	2	3	3	4	3	3	18	3	3
HF6	2	4	2	3	2	2	15	2.5	4
HF7	1	2	2	4	3	2	14	2.33	5

As per the Table 12, importance accorded by the firms to different initiatives in context to Hindrance factors of MkIS with the highest priority is that the computerized MkIS can solve all the management problems of planning and control of the business in the business systems respectively and followed by that MkIS is not as an information processing system in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively.

3.3.5 MkIS Sophistication – Study of 6 Manufacturing firms:

Table 13   MkIS Sophistication – Study of 6 Manufacturing Firms

MkIS Sophistication	F1	F2	F3	F4	F5	F6	Total of 6 Firms	Average of 6 Firms	Rank
SO1	4	3	3	5	3	3	21	3.5	3
SO2	3	4	4	3	4	4	22	3.66	2
SO3	3	3	3	4	5	5	23	3.83	1
SO4	3	4	4	2	4	3	20	3.33	4
SO5	2	2	3	3	2	3	15	2.5	6
SO6	4	3	4	4	1	3	19	3.16	5

As per the Table 13, importance accorded by the companies to different initiatives in context to Factors Underlying MkIS Sophistication, with the highest priority is threat to new entrants and followed by meeting customer needs in all the three sectors, i.e., cutting tools, sports goods and bicycle components respectively.

3.4 Synthesis of Survey Based Results and Case Study Analysis:

This section deals with synthesis of the survey based results of 140 SMEs and case study analysis. The top two factors of each predictor are selected on the basis of the analysis of the priorities accorded by the manufacturing SMEs in all the three sectors, i.e., cutting tools, sports goods and bicycle components.

3.4.1 Synthesis for MkIS Design characteristics:

It is analysed that Accurate information and Timely information are the top priorities.

3.4.2 Synthesis for Capabilities of MkIS:

It is analysed that high priority to sophisticated analysis of data has an ability to make recommendations as an aid to decision making and also it provides invaluable decision support information are the top priorities.

3.4.3 Synthesis for Primary characteristics of MkIS:

It is analysed that Emails of Internet along with processed information (e.g., sales forecasts, market share, distribution trend, etc.) which is maintained in the database are the top priorities.

3.4.4 Synthesis for Hindrance factors of MkIS:

It is analysed wherein the belief is that the computerized MkIS can solve all the management problems of planning and control of the business followed by that MkIS is conceived as a data processing and not as an information processing system in the database are the top tpriorities.

3.4.5 Synthesis for MkIS Sophistication:

It is analysed that meeting customer needs and threat to new entrants are the top priorities.

4. Conclusion

As per the Fig. 1, top two factors of each independent variables of MkIS in three categories viz. cutting tools, sports goods and bicycle components have been taken with the validation of the survey based results of 140 SMEs and case study respectively for highlighting the overall scenario of Success of MkIS Model.

Many organizations use MkIS successfully, others do not. Though the hardware and the software is the latest and has appropriate technology, its use is more for the collection and storage of data and its elementary processing. There are some factors which make the MkIS a success and some others, which make it a failure. The results of the present study highlight that MkIS and developments in SMEs of Punjab are still at initial stage. It can be concluded that the consequent opening up of many SMEs, the enterprises have a variety of challenges in front. MkIS has made the SMEs sector today to rise up to the occasion by devising and formulating a number of

marketing strategies. Efforts have to be made by this sector if it wants to survive in the present day world of competition. Further, though activities like management training programs, computerization, maintain of database, improvement in functional evidence etc. are being provided by SMEs, it is suggested that SMEs sector should also take a fresh look at these aspects and introduce necessary changes in them. It is recommended that SMEs, which are carrying out MkIS must make efforts to introduce new concepts in their systems.
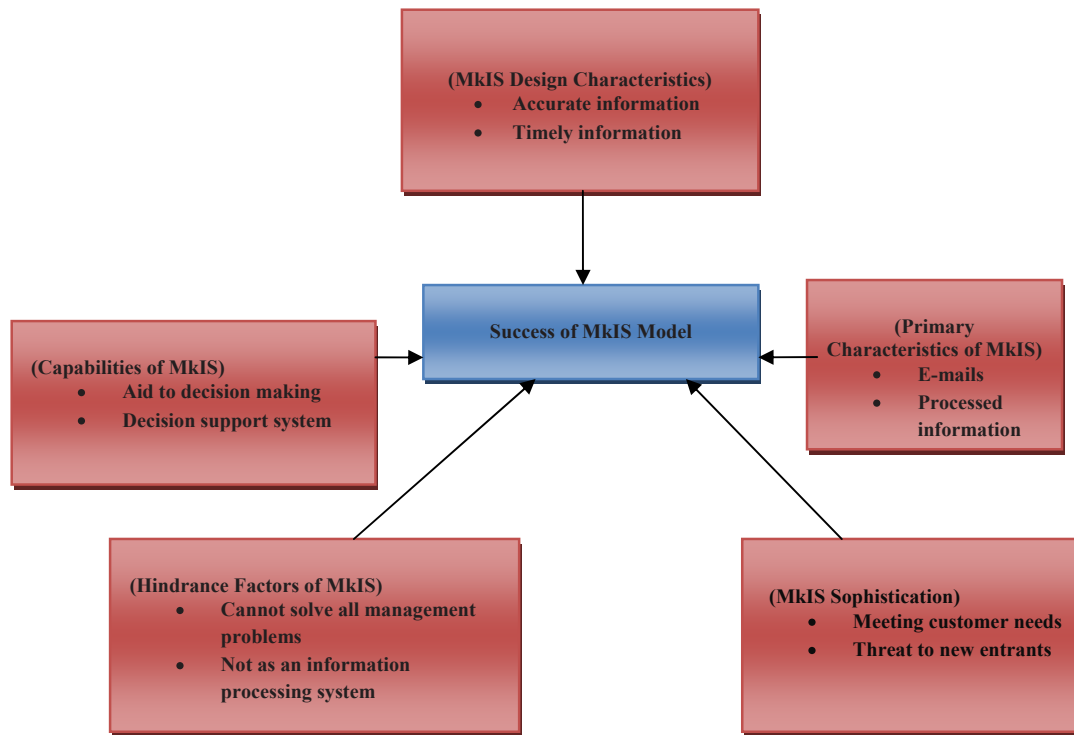

Fig. 1. Success of MkIS Model with top two factors of each independent variable of MkIS in the three categories viz. cutting tools, sports goods and bicycle components.

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