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Outcomes of Knowledge Management in Selected Steel Industries: An Empirical Study

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Abstract: The decision on implementing knowledge management (KM) depends on the benefits of the KM system in any organization. This study aims to understand the benefits inferred by implementing KM in steel industries in particular and other industries in general. We intend to identify and examine four important outcomes of KM in the steel industry in Odisha: organizational effectiveness (OE), organizational learning (OL), innovation (INO), and competitive advantage (CA) which are found to be strongly significant in our study. We have sourced data from the two steel plants: TATA Steel, Kalinganagar as a private entity, and Rourkela Steel Plant, Rourkela, as a public entity. With confirmatory factor analysis, consistency between items and constructs are strongly significant. In Structural equation model, we see a strong association between independent and dependent variables. Hence, the result suggests that the identified four outcomes of KM foster a deep impact on the steel industry for its all-round development in the competitive world by thriving towards the destination of success.

1. Introduction

Modern businesses, especially large manufacturing industries are increasingly facing stiff competition due to globalization, innovative technology, volatile consumers, cross-cultural employees amongst others. These are driving forces which have increased the quest to leverage techniques to achieve competitive advantage (CA)in every successful organization. In such a scenario, 'knowledge' is believed to be a vital indicator for bringing organizational success in every field (Allameh *et al.*, 2014; Panda *et al.*, 2021).

A firm having a proper knowledge management (KM) system is capable of using resources more efficiently and performs better than one that has adopted it rampantly (Darroch 2005; Allameh, 2018; Dang and Hoai, 2019). A good quality of organizational knowledge improves performance significantly in the organization (Zaied *et al.,* 2012). Some authors have identified outcomes of KM, such as competitive advantage, innovation, improved financial performance, anticipation of problems etc. in the organization. Hung *et al.,* (2005) suggested that to measure the significance of KM systems, three variables such as product or service competitiveness, overall performance, and long-term competitiveness, should be taken into consideration.

Steel industries are generally larger in terms of investment, production and overall progress of infrastructure development of any civilization. Evidence of studies of KM in steel industries can be found in Wiig (1999), where a systematic and comprehensive implementation of KM in Chaparral steel mill, a mini steel mill in Texas, USA in the year 1975 is explained. In the modern Indian steel industries, such as Steel Authority of India limited, Jindal Steel and Power limited, and TATA Steel, KM is actively used in practice (Dash & Rath, 2021). Collinson (1999) has said that KM in the steel industry is used in varied functions such as practices and procedures of governing it, inter-divisional coordination, management roles, budgeting & resource allocation, networking and information exchange, human resource development, employee relations, and employee motivation. Steel industries are large-scale organizations require a long time to make profit. Thus, the sustainability of the organization is essential in such industries which partly depends on employees' innovation capacity and their knowledge. Thus, KM has a greater impact on the steel industry.

The state of Odisha consists of very high-grade mineral deposition (Mishra et al, 2022). Iron ore reserves in Odisha comprise about 25% of the country. Two remarkable works i.e. industrial policy resolution in 2001 and enactment of the Odisha Industrial Facilitation Act, 2004 changed the industrial scenario of the state. Since then, 49 iron and steel industries have made memorandum of Understandings (MOUs) with the state government to start their operation. Some of them have 'started their operation', 'under construction' and withdrawn their MOUs because of varied reasons (Mishra *et al*., 2017).

In such, little literature is available for the academicians, industry managers and policy makers in the context of Odisha, which has motivated us to conduct this study.

The aim of this study is to identify and analyse outcomes of KM practice in the steel manufacturing industries in Odisha. This is a quantitative study, where emphasis has been given to define the outcomes through a contextual model. The hypotheses are analysed through Confirmatory Factor Analysis (CFA). Our study has both theoretical and managerial implications. Theoretically, we have focused on developing a model capable of understanding the relationship between observed variables and measured variables of different outcomes of KM and the covariance between the outcomes of KM in steel industries. In managerial implications, we provide a general guideline on prioritizing the variables under each outcome of KM while implementing or redesigning KM in the steel industry.

Remaining parts of the paper are as follows. Section-2 literature review on outcomes of KM, section-3 objectives and hypotheses, section-4 methodology used for various purposes, section-5 data analysis though quantitative techniques, section-6 results & discussion section-7 conclusion and scope for further study.

2. Review of Literature

2.1. Organizational Effectiveness (OE)

KM effectiveness is the result of organizational performance, which can be determined by considering the following three aspects: efficiency, adaptability, and innovativeness (Du Plessis, 2007). KM is an intervening mechanism between organizational context and OE (Zheng *et al*., 2010). Through KM, OE such as 'person job fit', 'innovation in production and service', 'coordination among units', 'adoptable capacity to unanticipated changes', 'reduced time', 'reduced overlapping development of corporate initiatives', and 'empowerment of employees' are achieved in the organization (Gold *et al.,* 2002; Azmawani *et al*., 2013).

2.2. Organizational Learning (OL)

King and Lekse (2006) suggest that KM practice enhances the learning attitude of the employees and converts the organization into a learning and teaching organization in the future. An organization with KM practices provides new learning opportunities for its workers by developing a learning framework, and adopting appropriate knowledge tools and technology (Heisig *et al*., 2016). Attia and Eldin (2018) argued that KM has a direct effect on improving the learning capability of individuals. A good KM practice contributes to financial performance and long-term sustainability of the organization. Thus, OL is considered as a major goal of KM. The KM enhances learning skills of the employees in various ways, such as rectifying prejudices, enhancing creativeness, extending business practices, and improving skills for executing organizational goals (Vandenbush and Higgins, 1996; Lee, 2012).

2.3. Innovation (INO)

To exploit a firm's innovative capacity, it is required to formulate organizational strategies to overcome human barriers. Knowledge exploitation and knowledge exploration have positive and significant effects on innovation. Different processes of KM such as knowledge storage, transfer, and application are positively related to innovative performance. Organizations require specific tools and practices for knowledge exploration and exploitation. In exploitation, the central goal is to use past knowledge and link the exploitative activities with learning and innovation. According to Donate and Gundamillas (2011) the innovation capacity in an organization improves due to interaction of culture and leadership. Darroch (2005) has identified that firms with greater capability to manage knowledge enhance innovation. According to Sareen and Pandey (2021) information on innovation is largely achieved through a proper relationship with customer, investor and supplier. Hence, a network relationship with the customer is constituted to enhance innovation capacity. According to (Tushman and Anderson, 1986; Darroch, 2005) innovation is of two types, i.e. 'incremental innovation' and 'radical innovation'. Incremental innovation is competence enhancing. Radical innovation puts business at risk because the existing KM does not have any impact on it.

2.4. Competitive Advantage (CA)

The CA of the organization can be created if knowledge is managed effectively (Basu and Sengupta, 2007). Organizations manage knowledge to utilize intellectuals and transform knowledge assets into

CA through enhanced organizational performance. Mainly, it concentrates on three basic things such as 'what it knows', 'how it uses what it knows', and 'how fast it can learn new things' (Singh and Sharma, 2011). CA is achieved by integrating individual knowledge in the context of the fulfilment of a common task (Linder and Wald, 2010). KM helps the organization to assess the KM capabilities and identify the gaps, then suggest measures (Zaied *et al.*, 2012). When competition increases, the organization intensifies its KM to boost CA with the limited available resources (Lin, 2014). According to Wahyono (2020) KM has an effect on achieving CA but it is mediated through product innovation. Hence, it is believed that KM leads to CA in the organization.

From the above literature, we identify that OE, OL, INO, and CA are the most significant outcomes of KM practices in different industries or sectors. Therefore, in our study we focused on assessing the above four critical attributes of KM practices while evaluating steel industries in Odisha.

3. Objectives and Hypotheses of the Study

3.1. Objectives

Two main objectives undertaken in our research are as follows:

- To identify key outcomes of KM practices and develop a conceptual model, and
- To examine and validate our developed model for KM outcomes in the steel manufacturing industry in Odisha.

3.2. Hypotheses

From the above literature, the following alternate hypotheses were drawn:

H_1: OE is a significant outcome of KM

H_2: OL is a significant outcome of KM

H_3: INO is a significant outcome of KM

H_4: CA is a significant outcome of KM

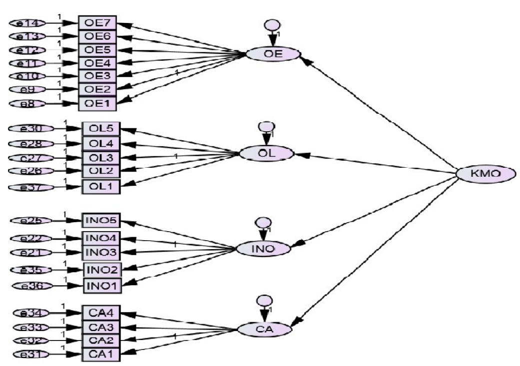

Figure 1: Second Order Model of KM Outcomes

Source: Authors' Own Compilation

Figure 1 is the proposed model. In this model, 'e' means error, 'rectangles' are the items and 'circles' are the unobserved variables '→' symbols are path icons(Shanthi, 2020). OE, OL, INO, and CA are latent variables comprising 7, 5, 5, and 4 observed variables respectively, which will be tested in further analysis.

4. Research Methodology

4.1. Scale

The items under scale have been identified from literature. For face validity of the questionnaire, a five-phase discussion with experts from industry and academia has been carried out to fix scale items. In the instrument, a total of four constructs, namely OE, OL, INO and CA, and 21 variables are considered. Data has collected by using a five-point Likert scale from (1) strongly disagree to (5) strongly agree. The sample of the instrument is given in the annexure.

4.2. Sample Size and Sampling Method

The total population for this study is 2810, which consists of all executives of two leading large-scale steel manufacturing companies in Odisha, i.e. TATA Steel, Kalinganagar as a private entity and Rourkela Steel Plant (RSP) as a public entity. The sample size for our study is 350, which is chosen according to a formula given by Yamane (1967).

We use the stratified proportionate random sampling technique for determining the number of samples in the study. A proportion of 204 samples from RSP and 146 samples from TATA Steel are collected for the study.

4.3. Data Collection

Data has been collected from both on-line and on-cite sources, where 42 filled in questionnaires received though online. This was a mere 12% of the total response. Therefore, we adopted a scheduled method to collect our required amount of sample data.

4.4. Pilot Study

Before the pilot study, the questionnaires were sent to 3 academicians and four industry experts to establish the face and content validity. The suggestions of the experts were incorporated to make the variables comprehensive and usable. 70 respondents were invited to carry out the pilot study. The reliability of the total scales and subscales was found to be significant. The Cronbach Alpha Values (CVA) of the scale items are reported in table 1.

Table 1: Cronbach Alpha Values

Constructs	*Items*	*Alpha Values*
OE	7	0.852
OL	5	0.897
INO	5	0.835
CA	4	0.831
Total	21	0.959

Source: Authors' Own Compilation

From table-1 we can see the CAV of 4 outcomes and a total value. All the individual construct's Alpha values are above 0.8, means reliability is good for all constructs. The total Alpha value is above 0.9 indicates that the reliability of the instrument is excellent.

4.5. Data Preparation

In the dataset, initially a total of 44 missing values were observed and by following up with respective respondents, all missing values were removed. We applied the 'Cook's distance' method (Shanthi, 2020) to detect sample outliers. A total of 32 outliers were detected and removed where the new data set included 318 respondents. The absolute value of skewness ranged between +2.89 & -2.89 and the kurtosis value ranged between -0.41 & -6.19 indicating that the value falls within the threshold value in social science, i.e. 3 for skewness and 10 for kurtosis (Cohen *et al.*, 2003).

5. Data Analysis

5.1. The Measurement Model

A measurement model is used in the case of CFA analysis where the effect and relationship between observed variables and constructs are determined. The model has been identified by using AMOS (analysis of movement structure) of the SPSS-23 package.

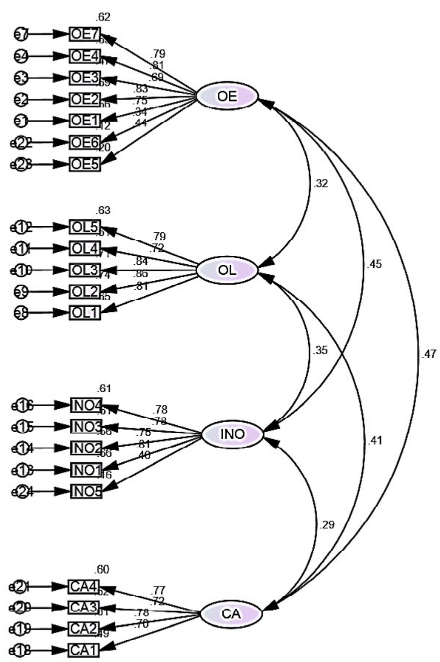

Figure 2: The Measurement Model of KMO

Source: Authors' Own Compilation

In figure 2, the model is a recursive model and comprises of 46 variables, of which 21 are observed variables and 25 are unobserved variables. Also, this model explains the relationship between observed and measured variables and among constructs. Symbol '↔' are the covariance icons. This is used to measure the correlation between unobserved variables.

Modification indices are used for the improvement of the model. In the model, only the covariance value between e-8 and e-10 is 37.206, where the values of different model fit measures are above the threshold values. Hence, no covariance between observed items is undertaken in this model.

The constructs are OE,OL, INO, and CA. The factor loadings of observed variables OE-5 (0.44), OE-6 (0.34), and INO-5 (0.40) are below a standard regression weight value of 0.7 and removed.

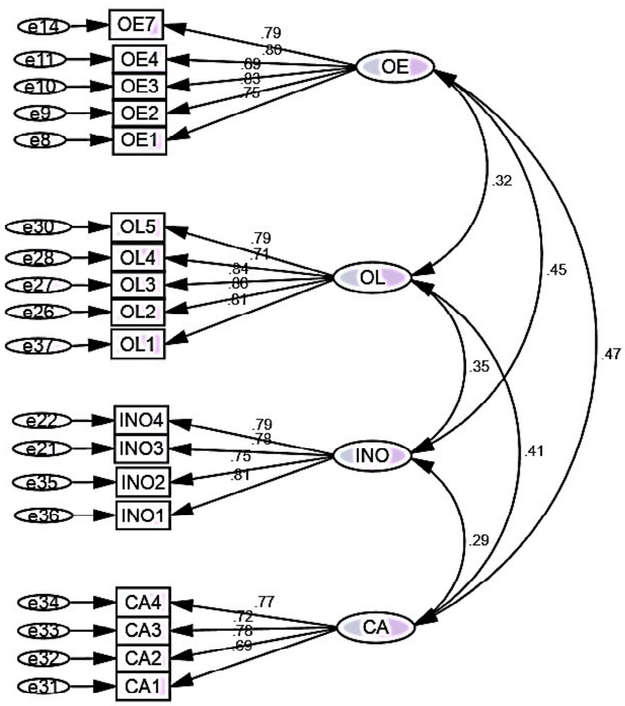

Figure 3: Modified Standardised Measurement Model of KMO

Source: Authors' Own Compilation

Figure 3 comprises 18 observed variables and 22 unobserved variables and further analysis was carried out with this new model. After removing the items, the new model is found to be more composed and fit.

5.2. Construct Wise Analysis

The analysis below has been carried out from figure-3, where we found the following details.

Construct-1: Organizational effectiveness

In OE, observed variables are five. The standard regression weights (SRW) of variables are OE-1(0.75). OE-2(0.83), OE-3(0.69), OE-4(0.80), and OE-7(0.79). Only the variable OE-3 value is 0.69 which is close to threshold value of 0.7and all other values are above the threshold value. The values show that variables for this construct are significant under this construct.

Construct-2: Organizational learning

In OL, the total variables under this construct are five. The SRW of variables OL-1(0.81), OL-2(0.86), OL-3(0.84), OL-4(0.71) and OL-5(0.79) are above the threshold value of 0.7. The values indicate that the variables are significant under this construct.

Construct-3: Innovation

In INO, there are four variables. The SRW of variables INO-1(0.81), INO-2(0.75), INO-3(0.78) and INO-4(0.79) are above the threshold value. Hence, the variables are retained for further analysis.

Construct-4: Competitive advantage

In CA, the total numbers of variables are four. The SRW of variables are CA-1(0.69), CA-2(0.78), CA-3(0.72), and CA-4(0.77). Only the variable CA-1 value is 0.69 as it is very close to 0.7, hence retained for further analysis.

Table 2: Regression Weights (Default Model)

			Estimate	*S.E.*	*C.R.*	*P*	*Label*
OE1	<—-	OE	1.000				
OE2	<—-	OE	0.964	0.062	15.635	***	
OE3	<—-	OE	0.836	0.066	12.618	***	
OE4	<—-	OE	0.902	0.060	15.102	***	
OE7	<—-	OE	0.774	0.052	14.765	***	
OL1	<—-	OL	1.000				
OL2	<—-	OL	1.238	0.067	18.403	***	
OL3	<—-	OL	1.164	0.065	17.882	***	
OL4	<—-	OL	1.031	0.072	14.262	***	
OL5	<—-	OL	1.072	0.065	16.422	***	
INO1	<—-	INO	1.000				
INO2	<—-	INO	0.796	0.053	15.110	***	
INO3	<—-	INO	0.895	0.056	16.021	***	
INO4	<—-	INO	0.921	0.057	16.163	***	
CA1	<—-	CA	1.000				
CA2	<—-	CA	0.972	0.072	13.571	***	
CA3	<—-	CA	1.025	0.081	12.609	***	
CA4	<—-	CA	1.005	0.075	13.446	***	

Source: Authors' Own Compilation

In table 2, the estimated values between observed variables with their respective constructs are positive. All the CR values are above 1.96, which indicates that the items have a significant relationship with their respective constructs. The p-values show that the significance levels of all the items are below .001. In OE and OL, all the indicator values i.e. estimates-positive, CR ≥ 1.96, and P<0.001 for 5 items are significantly and positively associated with their respective constructs OE and OL. In the case of INO and CA, all the indicator values such as estimates-positive, CR ≥ 1.96, and p<0.001 shows that items under each construct are significantly and positively associated with their respective construct. All the remaining 18 items are significantly and positively associated with their respective constructs.

5.3. Model Fit Measures

The table-3 depicts the value of different indices to explain the overall fitness of the model. The overall model fit relies on at least one absolute, one incremental, one parsimonious fit indices (Hair *et al*., 2019).

Table 3: The Measurement Model Fit Values for the KMO

Statistical measures	*Test indices*	*Test standard*	*Result*	*Interpretation*
Absolute fit measures	CMIN/DF	≤3**, ≤5*	1.158	Good fit
	RMSEA	≤0.08	0.022	Good fit
	RMR	≤.05	0.013	Good fit
	GFI	≥0.9**, ≥0.80*	0.862	Marginal fit
Incremental fit measures	NFI	≥0.9**, ≥0.80*	0.912	Good fit
	RFI	≥0.9**, ≥0.80*	0.906	Good fit
	IFI	≥0.9**, ≥0.80*	0.987	Good fit
	TLI	≥0.9**, ≥0.80*	0.986	Good fit
	CFI	≥0.9**, ≥0.80*	0.987	Good fit
Parsimonious fit measures	PNFI	≥0.5, the higher the better	0.852	Good fit
	PCFI	≥0.5, the higher the better	0.922	Good fit
	PGFI	≥0.5, the higher the better	0.773	Good fit
	AGFI	≥0.9**, ≥0.80*	0.846	Marginal fit

Source: Authors' Own Compilation
Note: Acceptability: **Good fit, * marginal fit

In the above table, CMIN/DF represents Chi-square degree of freedom, RMSEA stands for root mean square error of approximation, RMR is root mean square residual, GFI stands for goodness of fit index, NFI represents normed fit index, RFI is the abbreviation of relative fit index, IFI means incremental fit index, TLI stands for Tucker-Lewis index, CFI denotes comparative fit index, PNFI is parsimony normed fit index, PCFI is parsimony comparative fit index, PGFI stands for parsimony goodness of fit index and AGFI denotes average goodness of fit index.

By analysing our data in table 3, we obtained the following.

5.3.1. Absolute Fit Measures

Under this fit measure, in the case of RMSEA (0.022), RMR (0.013), GFI (0.862), and CMIN/DF (1.158). From the analysis it is found that the indice GFI is marginally fit and other indices appear to be a good model fit.

5.3.2. Incremental Fit Measures

Under this fit measure, the values observed for all indices are NFI (0.912), RFI (0.906), IFI (0.987), TLI (0.986) and CFI (0.987) shows that the indices values are above their threshold value. Hence, it indicates that the model appears to be a good fit.

5.3.3. Parsimonious Fit Measures

Under this measurement,the values of indices are PNFI (0.852), PCFI (0.922), PGFI (.773), and AGFI (0.846). The indice AGFI is marginally fit and other indices are good fit and indicate that the model appears to be a good fit.

From the above three measures and their respective indices values, it can be safely concluded that the model fit is good for this research.

Table 4: Reliability and Validity of Four Outcomes of KM

	AVE	*CR*	*MSV*	*ASV*	*OE*	*OL*	*INO*	*CA*
OE	0.598	0.881	0.220	0.170	**0.773**			
OL	0.647	0.901	0.168	0.129	0.32***	**0.804**		
INO	0.612	0.863	0.202	0.113	0.45***	0.35***	**0.782**	
CA	0.552	0.831	0.220	0.152	0.47***	0.41***	0.29***	**0.742**

Source: Authors' Own Compilation

Note: Significance level is ***=0.001.

The diagonal values with bold numbers are the square root of the AVE and others are the correlation coefficients of various dimensions. In this table, AVE means average variance extracted, CR is construct reliability, MSV stands for mean square variance and ASV is average square variance.

5.4. Reliability and Validity of the Model

5.4.1. Composite Reliability

All the CR values under this model are above the threshold value of 0.7 (table 4). This indicates that there is a high degree of structural relationship between indicators and the constructs.

5.4.2. Convergent Validity

The CR values of all the constructs are above the bold value 0.7 and AVE values above 0.5 (table 4). The CR values are greater than AVE values. The variables under different constructs are strongly associated with their respective constructs. The value of AVE and CR indicates that no convergent validity issue exists in the model.

5.4.3. Discriminant Validity

Under this analysis, the inter-construct covariance values are examined. The values of AVE for all the constructs are greater than both MSV and ASV. Square roots of AVE for all constructs are greater than the horizontal and vertical values (table 4). It shows that no discriminant validity issue exists in the model.

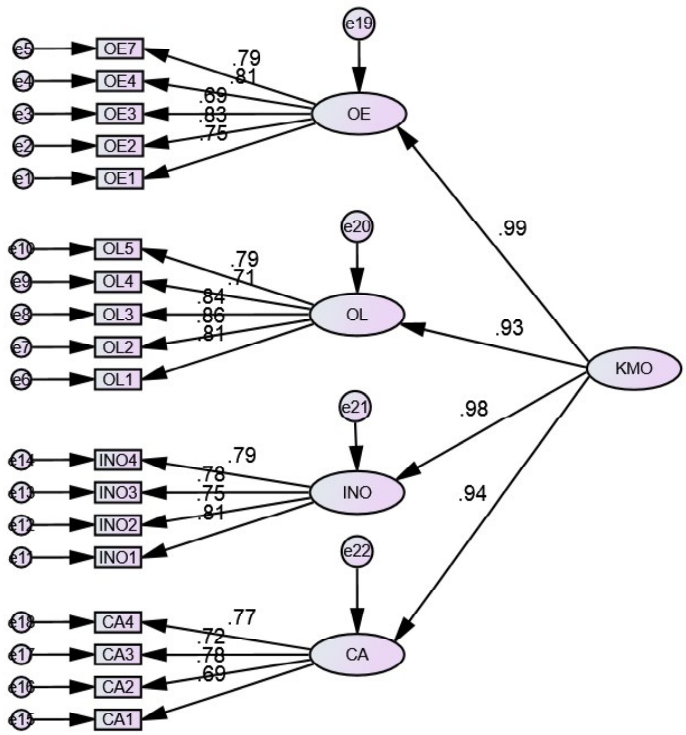

Figure 4: Hypotheses Testing Model of Four Outcomes of KM (The SEM)

Source: Authors' Own Compilation

Figure 4 describes the relationship between four (4) observed variables such as OE, OL, INO, and CA with one (1) latent construct i.e. knowledge management output (KMO). In figure 3 we identified the relationship between 18 observed variables and 4 unobserved variables, which appear in figure 4 as well. The difference between figure-3 and figure-4 is that the latent variables in figure 3 are observed variables where as KMO is the latent variables in figure-4. In the latter figure we have identified the standardised regression values between KMO and OE, OL, INO, and CA. The detailed explanation of this model has been carried out in table 5 and table 6.

Table 5: Model Fit Indices of the SEM

Indices	*Score*	*Impression*
CMIN/DF	1.722	Good fit
RMSEA	0.48	Good fit
RMR	0.021	Good fit
GFI	0.930	Good fit
NFI	0.950	Good fit
RFI	0.942	Good fit
IFI	0.978	Good fit
TLI	0.975	Good fit
CFI	0.978	Good fit
PNFI	0.813	Good fit
PCFI	0.838	Good fit
PGFI	0.731	Good fit
AGFI	0.909	Good fit

Source: Authors' Own Compilation

The table 5 represents different indices values for incremental, absolute, and parsimonious measures under the study. The result shows that all the values are above their respective threshold value. Hence, a good model fit exists in this study.

Table 6: The Result of Testing of Hypothesis

Hypotheses	*Direction*	*(β)*	*CR*	*Estimates*	*SE*	*P*	*Impression*
KMO→OE	+	0.99	15.406	0.775	0.049	***	supported
KMO→OL	+	0.93	17.279	0.637	0.037	***	supported
KMO→INO	+	0.98	16.979	0.720	0.042	***	supported
KMO→CA	+	0.94	14.329	0.660	0.046	***	supported

Source: Authors' Own Compilation

(See below for discussions on Table 6)

5.5. Hypothesis Testing

In table 6, the hypotheses are tested by using SEM. The following measures such as the standardized path coefficient (β-value), critical ratio value (t-value), degree of estimated coefficient (E) standard error (SE), and significance value (P) are considered for analysis. Indicator values of hypotheses show that KMO is significantly and positively associated with OE, OL, INO, and CA. Hence, all the null hypotheses are rejected and alternative hypotheses are accepted in this study.

6. Results and Discussion

The study was conducted with the objective of identifying the outcomes of KM practices in the steel manufacturing organization. From the literature, four (4) such KM outcomes i.e. OE, OL,INO, and CA were identified and empirically tested in the said industry. By using CFA, the outcomes of the KM i.e. OE, OL, INO, CA are found to be strongly and positively associated. The factor loadings of each observed variable with their respective constructs indicates that there is a strong correlation between them. The factor loadings of items OE-5, OE-6, and INO-5 are found to be below the threshold value of 0.7 (figure 2) and indicates a weak relation with their respective constructs. Hence, these items were removed and the model was subjected to further analysis as mentioned in figure 3. The reliability and validity test between items and constructs were found to be valid. Hence, the items under each construct are strongly associated with each other. Individual items and the aggregation of the items with their constructs are strongly associated with each other. The validity test suggests the existence of strong variations among the four outcomes of KM.

Therefore, we see that the outcomes of KM have a strong association in the steel industry. The result of the SEM model also indicates a strong and positive association between the independent and dependent variables.

This study is evaluating KMO in the steel industry in Odisha. The result of this study confirms that OE, OL, INO, and CA are the outcomes of KM in the steel industry. The study will help the managers by pointing out the major outcomes of KM and focus that needs to be given on items under each outcome. This study will support as first-hand information for the managers when applying or redesigning KM and searching for the output of KM. Construct wise application is discussed at the following glance.

First, KM establishing OE an outcome of KM in the steel industry. Through KM practice,OE has been ensured by realizing higher levels of person-job-fit, improvised service and goods quality, coordination, enhanced adoptable capacity for unprecedented change, and management commitment to empower employees. OE is an outcome of KM that is confirmed by some previous researchers such as (Alavi and Lendner, 2001; Chiu and Chen, 2016).

Second, OL is an outcome of KM in the steel industry. The KM practice enhances the learning capability in the organization by identifying and removing prejudices, enriching people's creativity, broadening people's insight, improving and enhancing techniques to execute business. This is consistent with (Handzic, 2011; Lee *et al.*, 2012; Bahrami et al., 2013, Nafi, 2014; Attia and Eldin, 2018).

Third, KM practice leads to innovation in the steel industry. By practicing KM, the organization enhances its existing methods and procedures, adopts new methods, easily finds various alternative work methods, improves individual efficiency and saves time by eradicating unnecessary actions. Some researchers such as (Darroch and Naughton, 2002; Xinli, 2015; Elmorshidy, 2018) have favored this notion.

Fourth, CA can be achieved by adopting KM in the steel industry. This is felt when the organization achieves better return on investment, higher growth, acquires a new segment of customer and fulfils the demand in a quickest manner. This statement 'CA is an important outcome of KM' is also supported by (Carneiro, 2000; Chuang,2004; Aydin and Dube, 2018).

Overall, this study will bring rational ideas about understanding the KM outcomes in the steel industry.

7. Conclusion

The study based on the intent of identifying and defining the outcomes of KM in the steel industry with four outcomes i.e. organizational effectiveness, organizational learning, innovation, and competitive advantage are found to be strongly significant. The consistency between items and constructs are found to be strongly significant. In addition, the aggregation of items with its constructs are strongly associated. Moreover, the SEM model also indicates a strong association between independent and dependent variables. Hence, we conclude that the outcomes of KM foster a deep impact on the steel industry for its all-round development in the competitive world thriving towards the destination of success.

The data used in the study was collected from two steel manufacturing industries. In future studies, it would be interesting to incorporate other steel industries from different provinces of India to broaden the scope of analysis and compare the conclusions with this paper. One may include more respondents to study the correlations. The model may be modified suitably and examined in other manufacturing industries with possibly new variates, which will be an interesting aspect of the analysis.

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Annexure- 1
The Instrument / Questionnaire

Sl. No.	*Outcomes*		*Items/questions*
1	OE		After KM system is introduced
		OE-1	person-job fit has been ensured
		OE-2	innovation in production, product and service has been improved
		OE-3	coordination among different units has been improved
		OE-4	adaptable capacity to unanticipated changes is enhanced
		OE-5	market response time has been decreased
		OE-6	overlapping development of corporate initiatives has been reduced
		OE-7	commitment to empowering employees has been increased
2	OL		The knowledge acquired from KMS
		OL-1	enables to rectify prejudices
		OL-2	enables the development of creativeness
		OL-3	enables creative views in new direction
		OL-4	broadens views on business practices
		OL-5	improves perspectives on the execution of business processes
3	INO		KMS in organization helps in
		INO-1	developing new production methods and procedures
		INO-2	developing existing methods and procedures
		INO-3	identifying alternative ways to carry out work
		INO-4	improving individual ability to carry out work
		INO-5	accomplishing the task in less time
4	CA		Compared to our key competitors, our organization
		CA-1	ensuring higher ROI (Return on Investment)
		CA-2	ensuring higher growth
		CA-3	is attracting more new customers
		CA-4	is quickly meeting the deadlines set by clients