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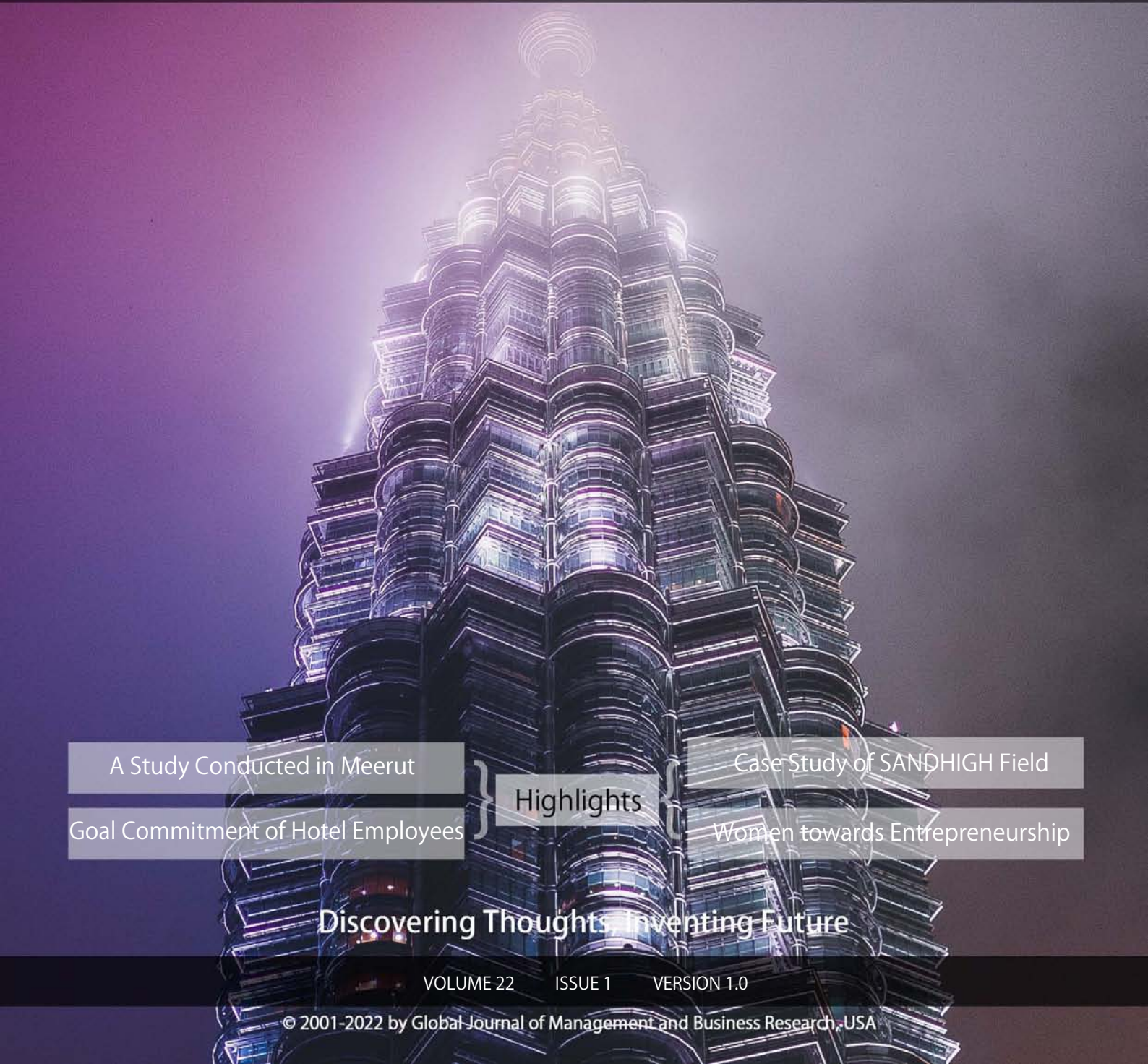

A Study Conducted in Meerut

Goal Commitment of Hotel Employees

Highlights

Case Study of SANDHIGH Field

Women towards Entrepreneurship

Discovering Thoughts, Inventing Future

VOLUME 22 ISSUE 1 VERSION 1.0

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Holistic Thinking and Proactive Decision-Making with Goal Commitment of Hotel Employees

By Jieun Kim & H. Michael Chung
Daegu Catholic University

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Proactive decision-making considers objectives, the search for further information, alternatives, and decision radars. The hypotheses regarding the relationship among the variables were empirically tested with hotel employees. The results indicate that the hotel employees' causality, perception of change, and locus of attention were related positively to their organizational goal commitment while their attitude towards contradiction negatively influenced it. Furthermore, holistic thinking did not make a significant direct impact on proactive decision-making. In addition, goal commitment significantly influenced the seeking for more information and use of decision radar, while it failed to influence searching for objectives and alternatives.

Keywords: holistic thinking, proactive decision-making, organizational goal commitment, hotel employees, decision-making.

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Finally, it was found that organizational goal commitment significantly mediates the relationship between holistic thinking and proactive decision-making.

Keywords: holistic thinking, proactive decision-making, organizational goal commitment, hotel employees, decision-making.

I. Introduction

As customer service is an important factor that affects the economic and strategic stake in the hotel industry, it has attracted significant attention in both academia and the industry (Rao and Sahu, 2013;

Nguyen Nguyen, Ha, Anh, & Matsui, 2015). Often the employees of hotels, particularly in upscale hotels, must go beyond standard operating procedures and address issues with unique and customized solutions (Victorino, Bolinger, & Verma, 2012). In such upscale hotels, customer-facing employees need to be trained beyond the basics to better serve customers.

For hotel employees, this can be addressed by paying attention to holistic and proactive approaches and training. However, the hotel's budget, operating and scheduling constraints, and traditional management culture often deter such actions to be taken into consideration. For example, the mean expenditure for training per available room in the hotel industry was no more than $76.03 (Mandelbaum, 2018).

How an employee makes a decision in responding to a given task has been studied with numerous approaches. Thinking style has a significant impact on human decision-making and is a critical predictor (Xiaotian & Jingyu, 2017; Kasser, 2010; Manni & Maharaj, 2004; Pagani & Otto, 2013; Siebert & Kunz, 2015; Wu & Parker, 2013; Khmil, 2013; Huggins, Deb, Claudio, & Velazquez, 2013; Magoutas, Apostolou, & Mentzas, 2015). In particular, holistically thinking individuals make more of a commitment to their organizations (Jaaron & Backhouse, 2014). In addition, proactivity comes with constant commitment towards a specific goal (Parker & Collins, 2010).

Therefore, it is important to study proactive behavior and holistic approaches as a thinking style to better understand its effects on problem solving. In this study, organizational goal commitment was examined as a mediator for the relationship between thinking style and decision-making for hotel employees. The study addresses the following research questions (RQ):

RQ #1: Does holistic thinking influence organizational goal commitment and proactive decision-making of hotel employees?

RQ #2: What aspects of holistic thinking have a significant impact on decision-making of hotel employees?

RQ #3: Does organizational goal commitment influence proactive decision-making of hotel employees?

RQ #4: Does organizational goal commitment mediate the relationship between holistic thinking and proactive decision-making of hotel employees?

II. Literature Review

In this section, holistic thinking, proactive decision-making, and organizational goal commitment and their relationships are discussed, followed by developing the hypotheses.

a) Holistic Thinking

Holistic thinking refers to an individual's awareness of the operation of the overall system and interrelationship of the details when the person considers a situational context and makes decisions (Kasser, 2010; Hitchin, 2007). Holistic thinking consists of causality, attitude towards contradiction, perception

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of change, and locus of attention (Choi et al., 2007). Causality states an individual's cognitive way of understanding a phenomenon. Attitude towards contradiction is an individual's cognitive adoption of moderation, meaning that when two contradictory opposites exist. People with this attribute often tend to choose a middle ground by embracing an opposite view (Choi et al., 2007, p. 693). Perception of change means an individual views a change as a natural flow due to the complex interconnection of each element. Locus of attention describes the identification of the whole picture of context related to an object. Individuals with a holistic locus of attention examine the parts by figuring out the whole picture and understanding a complex phenomenon as an integrated whole. Therefore, holistically thinking individuals consider possible alternatives before coming to a final decision and make an optimal choice that fits in with the ultimate objectives (Ji, Peng, & Nisbett, 2000; Choi, Dalal, Kim-Prieto, & Park, 2003).

b) Organizational Goal Commitment

Goal commitment is one's decisiveness to accomplish goals, resistance to abandoning them, and their consistent effort to reach them (Hollenbeck & Klein, 1987; Locke & Lathan, 1990). For example, when everyone in a group is given the same goal, those committed to that goal will perform better than those who are not (Hollenbeck & Klein, 1987; Klein & Wright, 1994). Lau (2012, p9) reported the significant impact of goal commitment on job satisfaction by stating that employees committed to the organization's overall goal tend to be satisfied. Organizational goal commitment helps the individuals accomplish their goals through self-initiated motivation.

c) Proactive Decision-Making

Proactive behavior refers to an individual's propensity to make effective change in one's environment (Bateman & Crant, 1993). People scan for opportunities, show initiative, take action, and engage in conscious goal-directed processes (Wu & Parker, 2013), with the core trait of proactive behavior being that an individual can change his/her physical circumstances and social atmosphere with initiative and aspiration. Individuals with proactive tendencies are not likely to be affected by external forces and look to actively interact with the situation. On the other hand, passive individuals react to the situation and are framed by their environment (Parker, Bindl, & Strauss, 2010).

Two dimensions of proactive decision-making are personality traits and cognitive skills (Siebert and Kunz (2015). Personality traits describes taking an initiative and striving for improvement, while cognitive skills consists of the systematic identification of objectives and alternatives, a systematic search for information and the use of decision radar. According to Siebert & Kunz (2015), taking an initiative refers to the willingness to change a situation to follow one's initiative. Striving for improvement means eagerness to make one's circumstances better and having a proactive orientation rather than remaining passive. Cognitive skills involve activities toward proactive behaviors. The systematic identification of objectives states the awareness of what individuals intend to reach, while systematic identification of alternatives is the extension of various options and openness to possible alternation of choice based on expected outcomes (Siebert & Kunz, 2015). Systematic search for information describes the information search that is relevant to decision-making. Use of decision radar describes visualizing the results and minimizing any potential problems before settling on a final decision (Frese & Fay, 2001; Greenglass, 2002).

d) Holistic Thinking and Organizational Goal Commitment (Developing Hypothesis 1-1 through Hypothesis 1-4)

Jaaron and Backhouse (2014) reported a positive relationship between systems thinking and affective commitment. Systems thinking is a holistic perspective where everything is connected to everything else; thus, the only way to fully understand a system is to understand its parts in relation to the whole (Shaked & Schechter, 2016). Resilient organizations require a holistic view and there seems to be a link between how much a holistic style of thinking is valued within an organization and the ability to sustain a satisfactory level of performance (Comfort et al. 2001; Pellissier 2011). With affective commitment which is a model of workplace commitment is an emotional attachment to the organization such that the strongly committed individual identifies with and enjoys membership within the organization (Meyer and Herscovitch 2001; Siders, George, Dharwadkar, 2001). Further, Jaaron and Backhouse (2014) reported the significant positive relationship between systems thinking and an emotional attachment to organizations. Thus, organizational goal commitment can have a positive relationship with holistic thinking.

Based on these arguments, the following hypotheses were developed involving each component of holistic thinking and organizational goal commitment:

H1-1: The hotel employees' causality is positively related to their organizational goal commitment.

H1-2: The hotel employees' attitude towards contradiction is positively related to their goal commitment.

H1-3: The hotel employees' perception of change is positively related to their goal commitment. H1-4: The hotel employees' locus of attention is positively related to their goal commitment.

e) *Holistic Thinking and Proactive Decision-Making (Developing Hypothesis 2-1 through Hypothesis 2-16)*

A holistic approach in the decision-making process is derived from the idea that everything is interconnected to each other, which brings about the system to include all opinions so as to draw a shared decision (Ruscio, 2003). A holistic approach focuses on the integration of parts and makes a new paradigm to include various perspectives. Holistic thinkers are unlikely to separate and distinguish each part of the organization, but rather are more likely to look at the system and integration of each unit as a whole. This could lead them to be more attentive of the overall organizational goals (Huggins et al., 2013).

Proactive decision-making describes an active involvement in opportunities, taking initiative, and constant efforts to achieve objectives (Bateman & Crant, 1993; Ruscio, 2003; Dolan, 2008; Siebert & Kunz, 2015). In addition, research on proactivity includes why an individual sets out to master and change one's situation, how he/she can achieve this change, and what the consequences of proactivity are for individuals and organizations (Wu & Parker, 2013).

Those who think holistically tend to search for more information before making a task related choice (Choi, Dalai, Kim-Prieto, & Park, 2003; Phillips et al., 2016). They are more likely to see background information and emphasize complex relationships (Hedden et al., 2000; Ji et al., 2000). Air traffic controllers with a holistic thinking style showed high involvement in proactive decision-making (Xiaotian & Jingyu, 2017). According to Benoit and Miller (2017), when there is a choice overload among products, a negative effect on satisfaction could occur. The study indicates that holistically thinking consumers are able to reduce such negative feelings by mitigating the overload feeling on satisfaction. It has been understood that individuals who think holistically can control negative emotions and move towards alternative options which make them more productive in specific situations.

Based on these arguments, develop the following hypotheses were developed involving each component of holistic thinking and proactive decision-making:

H2-1: The hotel employees' causality is positively related to their identification of objectives.

H2-2: The hotel employees' causality is positively related to their systematic search for information.

H2-3: The hotel employees' causality is positively related to their systematic identification of alternatives.

H2-4: The hotel employees' causality is positively related to their use of decision radar.

H2-5: The hotel employees' attitude towards contradiction is positively related to their identification of objectives.

H2-6: The hotel employees' attitude towards contradiction is positively related to systematic search for information.

H2-7: The hotel employees' attitude towards contradiction is positively related to their systematic identification of alternatives.

H2-8: The hotel employees' attitude towards contradiction is positively related to their use of decision radar.

H2-9: The hotel employees' perception of change is positively related to their identification of objectives.

H2-10: The hotel employees' perception of change is positively related to their systematic search for information.

H2-11: The hotel employees' perception of change is positively related to their systematic identification of alternatives.

H2-12: The hotel employees' perception of change is positively related to their use of decision radar.

H2-13: The hotel employees' locus of attention is positively related to their identification of objectives.

H2-14: The hotel employees' locus of attention is positively related to their systematic search for information.

H2-15: The hotel employees' locus of attention is positively related to their systematic identification of alternatives.

H2-16: The hotel employees' locus of attention is positively related to their use of decision radar.

f) *Organizational Goal Commitment and Proactive Decision-Making (Developing Hypotheses 3-1 through 3-4)*

Goal commitment motivates individuals to increase the actions associated with goal accomplishment (Aronson, 1997; Bem, 1972). When an individual recognizes their goals and considers them important to achieve, they tend to make consistent efforts related to goal achievement. Therefore, the hotel employees committed to organizational goals are likely to make more effective decisions. Pedersen (2015) reported school teachers' goal commitment made a positive impact on their task performance, willingness to achieve goals plays a role in enhancing a positive behavior. It is in line with Siebert & Kunz (2015), where they described how taking initiative refers to the willingness to change a situation to follow one's initiative. Striving for improvement is the eagerness to improve one's circumstances and have a proactive outlook instead of staying passive.

If hotel employees take organizational goals seriously and set attainable values, their decisions would be made in a proactive manner. The hypotheses for the relationship between the hotel employees' goal commitment and proactive decision-making are developed as follows:

H3-1: The hotel employees' goal commitment is positively related to their identification of objectives.

H3-2: The hotel employees' goal commitment is positively related to their systematic search for information.

H3-3: The hotel employees' goal commitment is positively related to their systematic identification of alternatives.

H3-4: The hotel employees' goal commitment is positively related to their use of decision radar.

g) Organizational Goal Commitment as Linking Mechanism (Developing Hypothesis 4-1 through Hypothesis 4-16)

Cerasoli and Ford (2014) reported the relationships between intrinsic motivation, mastery goal orientation, and performance. The relationship between intrinsic motivation and performance were mediated through mastery goal orientation, which indicates that the individuals' will to master their goals fosters the impact of intrinsic motivation on performance. Hwang & Joo (2017) studied the mediating effect of goal commitment in the relationship between leadership and organizational commitment. Furthermore, Choi, Kim, & Son (2012) reported a partially mediating effect of affective commitment for the relationship between self-leadership and innovative behaviors in a military setting.

Thus, organizational commitment seems an effective mediator between antecedent variables and predicted outcomes in the organizations. It is likely that organizational goal commitment mediates for the relationship between the employees' pattern of thinking and decision-making. The following hypotheses are developed to examine the mediating effect of organizational goal commitment on the relationship between holistic thinking and proactive decision-making:

H4-1: The hotel employees' organizational goal commitment mediates the relationship between causality and identification of objectives.

H4-2: The hotel employees' organizational goal commitment mediates the relationship between causality and systematic search for information.

H4-3: The hotel employees' organizational goal commitment mediates the relationship between causality and identification of alternatives.

H4-4: The hotel employees' organizational goal commitment mediates the relationship between causality and decision radar.

H4-5: The hotel employees' organizational goal commitment mediates the relationship between attitude toward contradiction and identification of objectives.

H4-6: The hotel employees' organizational goal commitment mediates the relationship between attitude toward contradiction and systematic search for information.

H4-7: The hotel employees' organizational goal commitment mediates the relationship between attitude toward contradiction and identification of alternatives.

H4-8: The hotel employees' organizational goal commitment mediates the relationship between attitude toward contradiction and decision radar.

H4-9: The hotel employees'' organizational goal commitment mediates the relationship between perception of change and identification of objectives.

H4-10: The hotel employees' organizational goal commitment mediates the relationship between perception of change and systematic se rch for information.

H4-11: The hotel employees' organizational goal commitment mediates the relationship between perception of change and identification of alternatives.

H4-12: The hotel employees' organizational goal commitment mediates the relationship between perception of change and decision radar.

H4-13: The hotel employees' organizational goal commitment mediates the relationship between locus of attention and identification of objectives.

H4-14: The hotel employees' organizational goal commitment mediates the relationship between locus of attention and systematic search for inform.

H4-15: The hotel employees' organizational goal commitment mediates the relationship between locus of attention and identification of alternatives.

H4-16: The hotel employees' organizational goal commitment mediates the relationship between locus of attention and decision radar.

III. Research Methodology

Section 3 describes the conceptual model of the empirical study, survey instruments and data collection.

a) Conceptual Model

Figure 1 shows the conceptual framework that presents the relationship among holistic thinking, organizational goal commitment, and proactive decision-making.

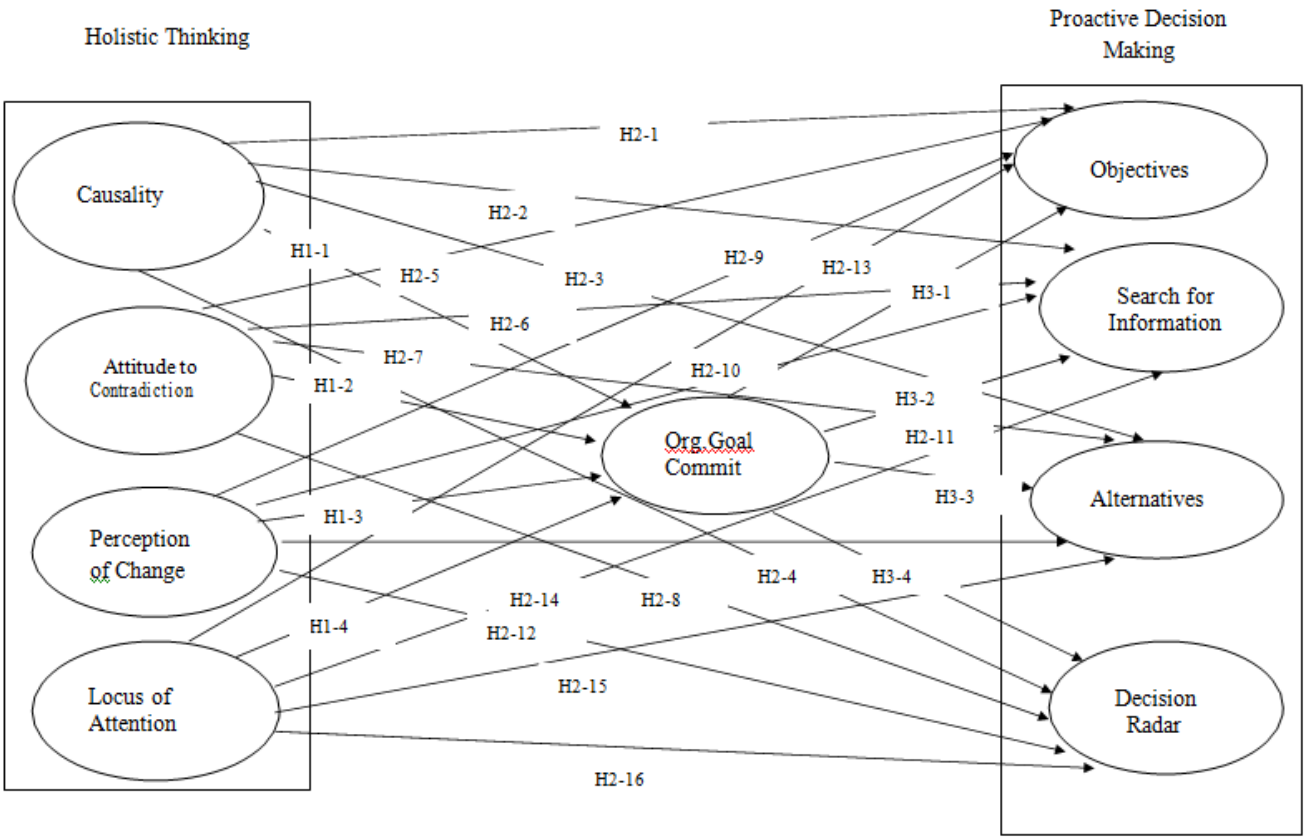


Figure 1: Conceptual model

b) Survey Instruments

Holistic Thinking: The instruments developed by Choi et al. (2007)'s 24-item scale were used to test holistic thinking. Holistic thinking includes sub-variables of causality, attitude towards contradiction, perception of change, and locus of attention. Subject responses were recorded using a 7-point Likert scale.

Organizational Goal Commitment: The evaluation of organizational goal commitment was based on a 5-item scale by Klein et al. (2001). The same 7-point Likert scale was used.

Proactive Decision-Making: Hotel employees' proactive decision-making was measured using Siebert and Kunz's (2015)'s 19 items of cognitive skills in proactive decision making. The four variables employed are objectives, information, alternatives and the use of decision radar. The respondents were asked to rate their decision-making behaviors in the workplace using the same 7-point Likert scale.

c) Data Collection

Following a pilot test of fifty subjects from two hotels, the main survey was conducted at top-rated five star hotels in Korea. Eleven hotels were contacted using convenience sampling. The study objective and the survey method were explained to the hotel senior management as well as operational level managers. Seven top-rated five start hotels agreed to participate in this study: the JW Marriot, Grand Hyatt, The Shilla, Sheraton, Millennium Hilton, Westin, and Paradise hotels. The survey materials were then distributed according to the scale of the hotels; 35 cases for hotels with 290 to 399 rooms, 45 cases for hotels with 400 to 499 rooms, and 50 cases for hotels with 500 to 700 rooms. A total of 289 responses were collected out of the 300 surveyed, and 272 survey responses were valid and used for the analysis.

IV. Results

Section 4 describes demographic information of the survey followed by validity and reliability, confirmatory factor analysis and correlation matrix. Then, it presents the details of the hypotheses testing.

a) Demographic Information

As summarized in Table 1, nearly 70% of the respondents are full time employees of a hotel. Nearly 80% of the employees are either a clerk or a supervisory level employee. Slightly less than half of the employees have up to three years of work experience and about 40% of the employees have 4-9 years of work experience. Slightly more than half of them are female and the majority of employees are in their 20's and 30's. Roughly half of them have at least a bachelor's degree.

Table 1: Demographics of the Survey

Respondents' Characteristics	Items	Frequencies (%)	Respondents' Characteristics	Items	Frequencies (%)
Gender	Male Female	114(41.9) 158(58.1)	Employment Status	Full time Temporary Contract	185(68.0) 87(32..0)
Age	20~29 30~39 40~49 50 or more	140(51.5) 103(37.9) 23(7.5) 6(2.2)			
Education	Associate Bachelors Masters or Higher Others	91(33.5) 132(48.5) 44(16.2) 5(1.8)	Department	Room Division Back Office F&B Catering Others	70(25.7) 52(19.1) 79(29.0) 56(20.6) 15(5.5)
Work Experience	1-3 years 4~6 years 7~9 years Over 10 years	132(48,5) 63(23.2) 41(15.1) 36(13.2)	Current Position	Clerk Supervisor Manager Director or Higher	156(57.4) 60(22.1) 39(14.3) 17(6.3)
The Total		272(%)	The Total		272(%)

b) Validity and Reliability

As indicated in Table 2, Cronbach's alpha of each construct in the model ranges between 0.710 and 0.871 and fulfills the cut-off point at alpha ≧ 0.60 (Lee, 2006). As construct reliability ranges between 0.723 and 0.889, internal consistency is supported (Kim, 2007). Average Variance Extracted (AVE) estimate ranging between 0.500 and 0.728 supports convergent validity (Farrell and Rudd, 2009).

The standardized factor loading of all measures was moderate ranging between 0.534 and 0.902 after some items that are less than 0.5 were excluded. The updated items explains the underlying construct by fulfilling the cut-off point of 0.5 and more adequately explains construct validity (Kim 2007). The excluded items were one item in causality, two items in attitude toward contradictions, three items in perception of change, one item in locus of attention, and two items in organizational goal commitment.

Table 2: Confirmatory Factor Analysis and Discriminant Validity

Factor	Item	Estimate	Sandard Coefficient	T-value	P-value	Cronbach's α	CCR	AVE
Causality	The relation of everything	1.000	0.849			0.864	0.830	0.569
	Integration of all	0.848	0.867	17.114	***			
	Causal relationship of all	0.776	0.714	12.986	***			
	Possibility of alterations in other elements from a single change in one element	0.794	0.726	13.302	***			
	Existence of unknown consequences from a phenomenon	0.518	0.534	9.065	***			
Attitude toward Contradiction	Desirability of middle ground than extremes	1.000	0.639			0.760	0.746	0.524
	Search for ways to compromise and embrace everyone's opinions at conflict	0.848	0.557	7.462	***			

	Importance of compromise than conflict with other's opinions	1.256	0.726	9.037	***			
	Desirability in harmony rather than in discord	1.075	0.753	9.205				
Perception of Change	Predictability of change in directions of phenomenon (r).	1.000	0.582			0.710	0.723	0.500
	Current situations can change at any time	0.995	0.799	9.483	***			
	Predictability of future events based on present situations (r).	1.216	0.644	7.087	***			
Locus of Attention	Value on a whole rather than apart to understand a phenomenon.	1.000	0.872			0.871	0.861	0.561
	Attention to the whole than its parts.	1.083	0.902	18.483	***			
	Value on the whole thing than the sum of its parts.	1.033	0.709	13.321	***			
	Attention to the whole context rather than the details.	0.818	0.660	12.035	***			
	Consideration of the whole picture to understand the parts	0.683	0.543	9.391	***			
Organizational Goal Commitment	Hardness to take organizational goal seriously (r)	1.000	0.777			0.755	0.733	0.501
	Commitment to pursuing organizational goal	0.849	0.650	11.550	***			
	Easiness to abandon this goal (r)	0.850	0.681	12.215	***			
Objectives	Clarification of objectives before choosing	1.000	0.848			0.834	0.889	0.728
	Awareness of job objectives in a decision situation	1.002	0.847	15.808	***			
	Engagement in systematic reflection of what I wish to achieve in the work	0.840	0.770	12.440	***			
Information	Information seeking to improve my decision making	1.000	0.699			0.775	0.793	0.562
	Systematic collection of decision-relevant information	1.141	0.791	11.125	***			
	Double check of information sources to be sure to have the right	1.132	0.740	10.546	***			

	facts before making decisions							
Alternatives	Good at identifying opportunities	1.000	0.668			0.842	0.758	0.512
	Systematic use of job objectives to create alternatives	1.011	0.711	12.253	***			
	Good at finding ways to achieve my job objectives.	1.084	0.771	10.806	***			
Decision Radar	Thorough thinking about when I make which decision	1.000	0.871			0.871	0.856	0.600
	Consideration of future events in my current decisions in the hotel	0.832	0.759	14.657	***			
	Awareness of my thinking process in a decision situation	0.756	0.799	13.034	***			
	Thorough consideration of how best to carry out a decision	0.721	0.624	11.272	***			
fit indices	5^2 (df:450)=1171.202, p=0.000, CMIN/df= 2.603, GFI= 0.825, AGFI=0.744, RMR=0.077, NFI=0.793, CFI= 0.859, RMSEA=0.077, ***: 0.000 (r):reversed score, CCR: Composite Construct Reliability, AVE: Average Variance Extracted							

c) Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was conducted to further examine the construct validity. CFA was applied to all items and chi-square of 1171.202 with the degree of freedom (df) of 450, and p-value of 0.000 ($p<0.001$). Goodness of fit was supported with the value of chi-square/df <3. For the threshold criteria of the model fit, Goodness-of-fit index (GFI) is desirable at ≧0.90. Adjusted Goodness of Fit Index (AGFI) is desirable at ≧0.80, Root Mean Square Residual (RMR) is desirable at ≦0.05, Normed Fit Index (NFI) is desirable at ≧0.90, Comparative Fit Index (CFI) is desirable at ≧0.90 and permissible at ≧0.80. Chi-square is desirable at >0.05, and Root Mean Square Error of Approximation (RMSEA) is very desirable at ≦ 0.05 and moderately desirable at <0.08.

In Table 2, actual fit indices values are NFI (0.793), AGFI (0.744), RMR (0.077), GFI (0.825), CFI (0.859), and RMSEA (0.077). Goodness of fit is inversely related to sample size and the number of variables in the model (Hu and Bentler (1999). Therefore, the small sample size with a large number of variables in the study can influence the results. Also, strictly adhering to recommended cut-off values can lead to the instances of incorrect rejection of an acceptable model (Marsh, Haw, and Wen, 2004; Hooper et al. 2008). It was concluded that the suggested study model is marginally acceptable as NFI (0.793) and AGFI (0.744) are at the border line of the cut-off value.

d) Correlation Matrix

Correlation coefficients range between 0.194 and 0.749 as shown in Table 3 and satisfies discriminant validity (Kim, 2007).

Table 3: Estimated latent factor correlations

Variable	Means	S.D.	1	2	3	4	5	6	7	8	9
Causality Attitude	5.781	0.834	1								
Change Locus of	5.865	0.807	0.375**	1							
Attention Org. Goal	2.149	1.028	0.541**	0.355**	1						
Comm.	5.389	1.100	0.328**	0.418**	0.445**	1					
Objectives	5.456	0.849	0.360**	0.303**	0.282**	0.431**	1				
Information	5.625	0.707	0.330**	0.240**	0.184**	0.330**	0.621**	1			
Alternatives	5.473	0.816	0.351**	0.267**	0.194**	0.215**	0.512**	0.537**	1		
Decision Radar	5.327	0.842	0.341**	0.219***	0.227**	0.367**	0.673**	0.616**	0.636*	1	
	5.639	0.799	0.378**	0.337***	0.280**	0.303**	0.749**	0.586**	0.581*	0.535*	1

**** significant at p<0.001, ** significant at p<0.01, * significant atp<0.05, S.D.: Standard Deviation*

e) Hypotheses Testing

For the results of overall measurement model testing, Table 4 shows the strength of the relationships amongst the constructs and overall goodness of model fit indices. The adequacy of the structural equation models was evaluated on the criteria of overall fit with the data. The results of hypotheses testing are described next.

i. *Holistic Thinking and Organizational Goal Commitment (H1-1 through H1-4)*

H1-1, explaining the relationship between causality and organizational goal commitment, was supported. The test result presents a path coefficient of 2.862 for the impact of the hotel employees' causality on organizational goal commitment ($t>1.96$, $p<0.001$). H1-2, explaining the relationship between attitude towards contradiction and organizational goal commitment, was not supported. H1-3, explaining the relationship between the perception of change and organizational goal commitment, was supported. The test result presents a path coefficient of 3.665 for the impact of the hotel employees' causality on organizational goal commitment ($t>1.96$, $p<0.001$). H1-4, explaining the relationship between the locus of attention and organizational goal commitment, was supported. The test result presents a path coefficient of 1.650 for the impact of the hotel employees' locus of attention on organizational goal commitment ($t>1.96$, $p<0.001$). Overall, H1, the impact of holistic thinking on organizational goal commitment is partially supported.

ii. *Holistic Thinking and Proactive Decision-Making (H2-1 through H2-16)*

H2-1, explaining the impact of the hotel employees' causality on objectives, was not supported. H2-2, explaining the impact of the hotel employees' causality on their information, was not supported. H2-3, explaining the impact of the hotel employees' causality on their alternatives, was not supported. H2-4, explaining the impact of the hotel employees' causality on decision radar, was not supported.

H2-5, explaining the impact of the hotel employees' attitude toward contradiction on objective, was not supported. H2-6, explaining the impact of the hotel employees' attitude toward contradiction on information, was not supported. H2-7, explaining the impact of the hotel employees' attitude toward contradiction on alternatives, was not supported. H2-8, explaining the impact of the hotel employees' attitude toward contradiction on decision radar, was not supported.

H2-9, explaining the impact of the hotel employees' perception of change on their objectives, was not supported. H2-10, explaining the impact of the hotel employees' perception of change on their information, was not supported. H2-11, explaining the impact of the hotel employees' perception of change on their alternatives, was not supported. H2-12, explaining the impact of the hotel employees' perception of change on their decision radar, was not supported.

H2-13, explaining the impact of the hotel employees' locus of attention on their objective, was not supported. H2-14, explaining the impact of the hotel employees' locus of attention on their information, was not supported. H2-15, explaining the impact of the hotel employees' locus of attention on their alternatives, was not supported. H2-16, explaining the impact of the hotel employees' locus of attention on their decision radar, was not supported. Overall, H2 for the relationship between holistic thinking and proactive decision-making were not supported.

iii. *Organizational Goal Commitment and Proactive Decision-Making (H3-1 through H3-4)*

H3-1, explaining the relationship between organizational goal commitment and objectives, was not supported. H3-2, explaining the relationship between organizational goal commitment and information, was supported. The result showed a path coefficient of 0.507 for the impact of the hotel employees' causality on organizational goal commitment. H3-3, explaining the relationship between organizational goal commitment and alternatives, was not supported. H3-4, explaining the relationship between organizational goal commitment and decision radar, was supported. The result showed a path coefficient of 1.850 for the impact of the hotel employees' causality on organizational goal commitment ($t>1.96$, $p<0.001$). Therefore, H3, the impact of organizational goal commitment on proactive decision-making was partially supported.

Table 4: Direct Effects and Fit Indices of the Model

Hypotheses	Path	S.C.	S.E.	T-value	P-value	Result
H1-1	Causality -> Organizational Goal Commitment	2.862	0.959	2.428	*	supported
H1-2	Attitude toward Contradiction-> Organizational Goal Commitment	0.657	0.509	1.506	0.132	rejected
H1-3	Perception of Change-> Organizational Goal Commitment	3.665	2.503	2.179	*	supported

H1-4	Locus of Attention-> Organizational Goal Commitment	1.650	0.478	2.544	*	supported
H2-1	Causality -> Objectives	1.653	0.716	1.642	0.101	rejected
H2-2	Causality -> Information	1.325	0.556	1.675	0.094	rejected
H2-3	Causality -> Alternatives	3.550	1.529	1.672	0.095	rejected
H2-4	Causality -> Decision Radar	-3.293	2.401	-1.267	0.205	rejected
H2-5	Attitude toward Contradiction-> Objectives	0.321	0.321	1.023	0.306	rejected
H2-6	Attitude toward Contradiction-> Information	0.313	0.249	1.266	0.205	rejected
H2-7	Attitude toward Contradiction-> Alternatives	0.719	0.681	1.093	0.274	rejected
H2-8	Attitude toward Contradiction-> Decision Radar	-0.599	0.964	-0.825	0.408	rejected
H2-9	Perception of Change-> Objectives	2.129	1.441	1.577	0.115	rejected
H2-10	Perception of Change-> Information	1.530	1.115	1.448	0.148	rejected
H2-11	Perception of Change-> Alternatives	4.651	3.084	1.630	0.102	rejected
H2-12	Perception of Change-> Decision Radar	-4.289	4.762	-1.249	0.212	rejected
H2-13	Locus of Attention-> Objectives	0.867	0.367	1.519	0.129	rejected
H2-14	Locus of Attention-> Information	0.333	0.284	0.747	0.455	rejected
H2-15	Locus of Attention->Alternatives	1.905	0.783	1.587	0.113	rejected
H2-16	Locus of Attention-> Decision Radar	-1.999	1.237	-1.352	0.176	rejected
H3-1	Organizational Goal Commitment -> Objectives	0.367	0.232	1.384	0.166	rejected
H3-2	Organizational Goal Commitment -> Information	0.507	0.182	2.408	*	supported
H3-3	Organizational Goal Commitment ->Alternatives	0.112	0.487	0.204	0.838	rejected
H3-4	Organizational Goal Commitment -> Decision Radar	1.850	0.852	2.466	*	supported
fit indices	$x2$ (df = 456)= 1205.641 (p = 0.000), CMIN/df= 2.644, GFI= 0.791, AGFI= 0.743, RMR = 0.077, NFI= 0.786, TLI=0.830, CFI=0.854, RMSEA=0.078					

*Note: *** significant at <0.001, ** significant at <0.01, * significant at <0.05, S.C.: standardized coefficient*

iv. *Organizational Goal Commitment as Linking Mechanism (H4-1 through H4-16)*

Table 5 depicts the mediating effect of organizational goal commitment for the relationship between the lower level component variables of holistic thinking and those of proactive decision-making.

Table 5: Mediating Effect of Organizational Goal Commitment

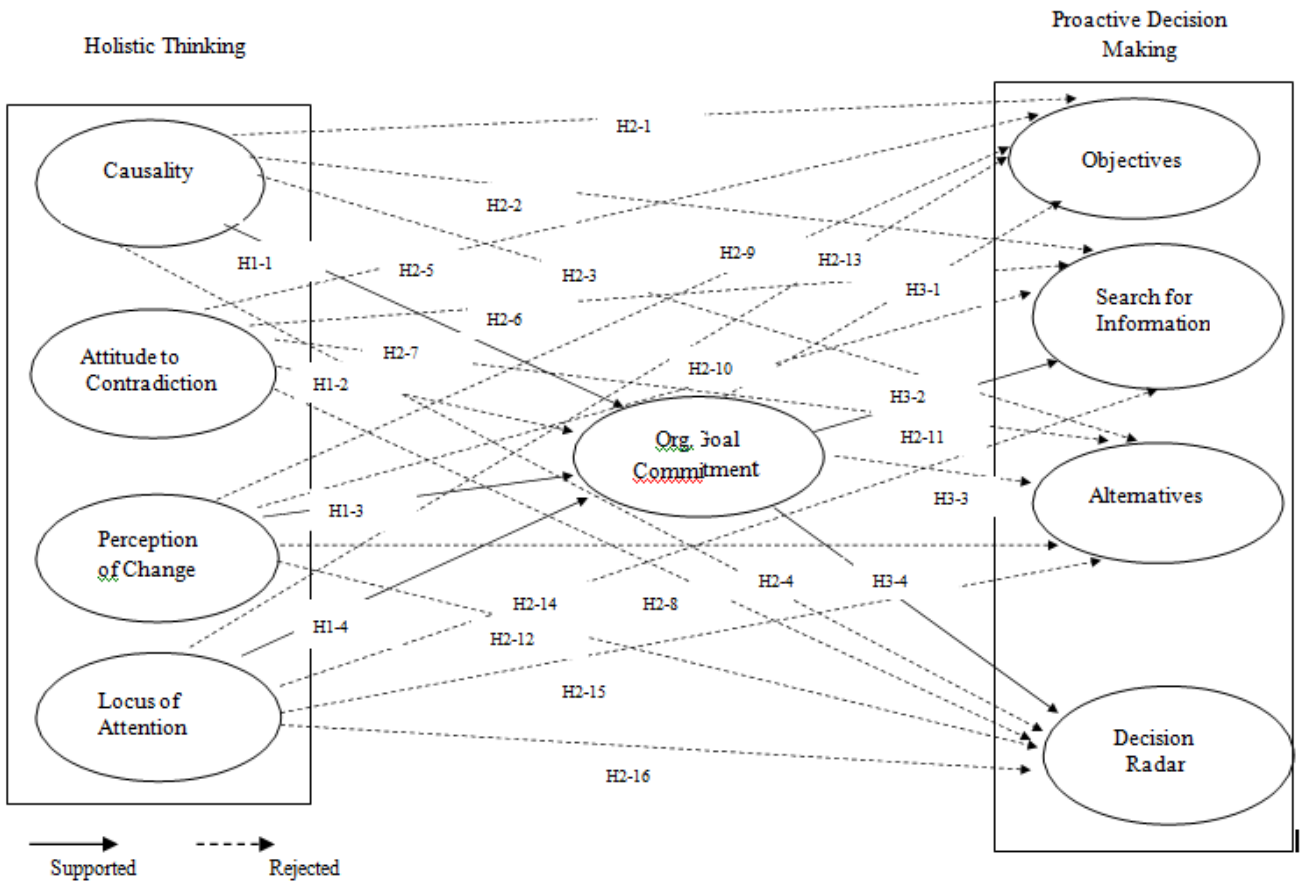
Hypothesis	direct (x->y)	indirect	Result
H4-1: Causality-> Goal Commitment-> Objective	1.653	1.051**	Full mediation
H4-2: Causality->Goal Commitment-> Information	1.325	1.450**	Full mediation
H4-3: Causality->Goal Commitment-> Alternative	3.550	0.321	No mediation
H4-4: Causality->Goal Commitment-> Decision Radar	-3.293	5.297**	Full mediation

H4-5: Attitude toward Contradiction- >Goal Commitment-> Objective	0.321	0.241	No mediation
H4-6: Attitude toward Contradiction - >Goal Commitment-> Information	0.313	0.333	No mediation
H4-7: Attitude toward Contradiction - >Goal Commitment-> Alternative	0.719	0.074	No mediation
H4-8: Attitude toward Contradiction - >Goal Commitment-> Decision Radar	-0.599	2.215	No mediation
H4-9: Perception of Change->Goal Commitment-> Objective	2.129	1.346*	Full mediation
H4-10: Perception of Change ->Goal Commitment-> Information	1.530	1.857**	Full mediation
H4-11: Perception of Change ->Goal Commitment-> Alternative	4.651	0.411	No mediation
H4-12: Perception of Change ->Goal Commitment-> Decision Radar	-4.289	6.782*	Full mediation
H4-13: Locus of Attention->Goal Commitment-> Objective	0.867	0.606*	Full mediation
H4-14: Locus of Attention ->Goal Commitment-> Information	0.333	0.836**	Full mediation
H4-15: Locus of Attention ->Goal Commitment-> Alternative	1.905	0.185	No Mediation
H4-16: Locus of Attention ->Goal Commitment-> Decision Radar	-1.999	3.054**	Full mediation

*Note: The significance of indirect effect was verified through bootstrapping, significant at *** p <0.001 , ** p<0.01 *p<0.05*

Table 5 shows that the mediating effects of organizational goal commitment on the relationship between causality and objectives, information, and decision radar were supported, whereas the effect of organizational goal commitment on the relationship between causality and alternatives was rejected. Thus, H4-1, 4-2, and 4-4 were supported while H4-3 was rejected.

The mediating impact of organizational goal commitment on the relationship between attitude towards contradiction and proactive decision-making was not supported. Thus, H4-5, 4-6, 4-7, and 4-8 were rejected. The mediating role of organizational goal commitment on the relationship between perception of change and proactive decision-making was supported except for the relationship with alternatives. This means H4-9, 4-10, and 4-12 were supported while H4-11 was rejected. The impact of perception of change on objectives, information, and decision radar was mediated through organizational goal commitment. The mediating impacts of organizational goal commitment on the relationship between locus of attention and proactive decision making were supported except for the relationship with alternatives. Thus, H4-13, 4-14, and 4-16 were supported while H4-15 was rejected. The summary of all hypotheses testing is graphically shown in Figure 2.



FitIndices:x^2(df=456)=1205.641(p=0.000),CMIN/df=2.644,GFI=0.791,AGFI=0.743,RMR=0.077,NFI=0.786,TLI=0.830,CFI=0.854,RMSEA=0.078

Figure 2: Final Model

V. Discussion

This study examines how organizational goal commitment explains the relationship between holistic thinking and proactive decision-making within the context of hotel employees. As the hypotheses testing of H1-1 through H1-4 indicates, the employees' goal commitment is positively related to their holistic thinking in terms of causality, perception of change, and locus of attention. The result is in line with Jaaron and Backhous (2014)'s study on organizational performance. Aspects of holistic thinking such as understanding the given situation, the intention and acceptance of change, and looking at the whole picture are positively related to organizational goal commitment. However, their attitude towards contradiction is not significantly related. One possible explanation is that hotel employees cannot always choose a middle ground solution when faced with contradictory problems, often due to customers' expectations that all their demands be met.

In regards to causality in hotel employees' holistic thinking, employees are more likely to be concerned with the long term outcomes for the organization, not immediate individual conflicts. If hotel employees have the perception of change, they are more likely to anticipate and predict potential variables in a situation and make efforts to create a desirable end result that is aligned with organizational goals. Furthermore, if hotel employees utilize a holistic thinking style, they are more likely to understand what the organization is trying to achieve and more actively participate in their role.

Overall, H2 shows that a significant relationship between holistic thinking and proactive decision-making was not supported. All of H2-1 through H2-16 were rejected. There is little research reported on the relationship between holistic thinking and proactive decision-making, however, Wu, Deng, and Li (2018) reported that proactive behavior would initiate actions that aim to master the environment.

This study examined whether holistic thinking could explain the variance of proactive decision-making. Any direct relationship that exists between the two processes is not clearly supported, and there is little research reported. Traditionally, the culture surrounding hotel employee structure has been largely hierarchical and rule-oriented. Given this, hotel employees may not generally be open to innovative problem-solving and would require training in holistic and proactive thinking.

H3 shows that the test results of the relationship between organizational goal commitment and proactive decision-making are mixed. While information and the use of decision radar are positively related, the objectives and the alternatives are not. Ohly and Fritz (2007) examined the correlation between work motivation and proactive behavior. For example, their study found that intrinsic work motivation was not significantly related to proactive behavior, whereas self-efficacy was significantly related. The relationship between organizational goal commitment and proactive decision-making seems inconclusive, although previous studies used different domains and factors. Such results merit further research on the relationship between organizational goal commitment and proactive decision-making.

H4 examined the mediating role of organizational goal commitment between holistic thinking and proactivity in decision-making. It sheds light on understanding H2 and H3: a direct relationship between holistic thinking and proactive decision-making was not supported in hypotheses 2 testing. Through hypotheses 3 testing, it was found that a relationship between goal commitment and proactive decision-making was partially supported. A plausible explanation of the hypothesis not being accepted could be that the employees might not have sufficient time to consider various alternative solutions due to time constraints or lack of training.

The effects of causality on objectives, information, and the use of decision radar as mediated by goal commitment were supported, whereas the mediating effects of causality on alternatives through goal commitment were not supported. As stated earlier, the impact of attitude towards contradiction on proactive decision-making was not supported. Additionally, the mediating effect of attitude towards contradiction on proactive decision-making was not supported.

The employees with causality are likely to consider the importance of interdepartmental relationships and may make their final decision through collaboration. A rejection of the hypothesis on the alternatives and the attitude towards contradiction might be interpreted as a non-consideration of such collaboration.

As stated earlier, the impact of perception of change on proactive decision-making was not supported. The mediating effects of perception of change on objectives, information, and the use of decision radar except the alternatives through organizational goal commitment were supported. However, the alternatives might be processed in other stages, such as the use of decision radar due to other reasons. When hotel employees with a perception of change face unexpected situations, they might address the problem proactively with their organizational goals at the forefront of their decision-making.

As shown in hypotheses testing, the locus of attention does not make an impact on proactive decision- making. The mediating impacts of the locus of attention on objectives, information, and the use of decision radar except the alternatives through organizational goal commitment were also supported. While the locus of attention might affect hotel employees' ability to make proactive decisions through the attitudinal variable, the employees may not have confidence in making proactive decisions based only on the alternatives. On the other hand, the alternatives may also work with other proactive decision- making variables and may reduce its impact. Such interpretation would merit further research.

Attitudinal variables need to be mediated in order to make holistic thinking effective for proactive decision-making in the hotel industry. The other mediating variables can be further investigated to understand whether they enhance the relationship between holistic thinking and proactive decision-making. The employees' locus of attention can contribute to proactive decision-making through attitudinal change. Alternatives may not be applicable to all of their decision-making, or it may be applicable when combined with other factors. This is still uncertain and it would be worth further examining how other mediating factors might generate an impact between holistic thinking and proactive decision-making.

Pedersen (2015) reported the impact of goal commitment on task performance among teachers. Xiaotian & Jingyu (2017) reported that holistic thinking could influence decision-making that was independent of work experience in the air traffic control domain. They further emphasized that the thinking style could be employed for the selection and training of decision-makers. In addition, Cerasoli and Ford (2014) found a mediating role of goal orientation on the relationship between motivation and performance behavior with a student group. This study highlights that the hotel employees' organizational goal commitment works mostly as a mediator in explaining the relationship between holistic thinking and proactive decision-making, and that holistic thinking could positively impact proactive decision-making when goal commitment is involved.

VI. Conclusion

The purpose of this study was to provide the empirical evidence of the significance of holistic thinking and goal commitment on improving proactive decision-making in the context of upscale hotel employees. This study found limited significance. The first research goal was accomplished as causality, perception of change, and locus of attention were found to be significant antecedents of organizational goal commitment. The second research goal was fulfilled as it was found that

holistic thinking is not a direct antecedent of proactive decision-making. The third research goal was met as it was found that organizational goal commitment significantly influences the search for information and decision radar. The final research goal was accomplished as follows: Although holistic thinking did not make a significant impact on proactive decision-making, the concepts of causality, perception of change, and locus of attention made a significant impact on objectives, information, and use of decision radar when organizational goal commitment intervened in the relationship. This indicates a significant mediating effect of organizational goal commitment on the relationship. However, organizational goal commitment did not mediate the impact of attitude towards contradiction on proactive decision-making.

This study presents the following managerial and practical implications: When hiring and training employees, hotel managers should examine the prospective candidate's decision-making characteristics as a holistic thinker as well as their organizational goal commitment. For example, the human resources department of a hotel might utilize example scenarios and case studies during an interview to gauge an applicant's propensity for holistic thinking. Holistic thinking skills can also be learned on the job to encourage overall organizational improvement (Cohen, Freeman, and Thompson, 1998; Snyder and Snyder 2008).

In addition, the hotel management should make their employees aware of the organizational goals of the hotel. For larger organizations, it can prove difficult to streamline goals across all departments and monitor each employees' individual decision-making processes. It may be helpful to introduce employee incentives to encourage thinking towards meeting organizational goals.

The limitations of this study are as follows: For example, there is a possibility that survey respondents could have answered the questions in accordance with social norms. Additionally, their answers for previous questions may have influenced their responses for subsequent questions in the survey. It would be interesting to examine whether proactive decision-making resulted in enhancing the satisfaction of hotel guests. Therefore, future research would examine the predictability and effectiveness of decision- making and thinking style on customer satisfaction.

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Factors Influencing the Overall Motivation of Women towards Entrepreneurship: A Study Conducted in Meerut City (UP), India

By Shweta Sharma & P.K. Agarwal
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Abstract- *Purpose:* This paper highlighted the significance of various factors influencing the overall motivation of women towards entrepreneurship. The study was based on the empirical study conducted in Meerut City in western UP, India.

Design/Methodology/Approach: The paper employed the exploratory research design in the initial stage for identifying the influencing factors and furthermore descriptive research design was used to analyse the primary data. The sample unit was the women entrepreneur of Meerut City with sample size of 250 (valid responses). Tabulation, Cross Tabulation & Descriptive Statistics was used to describe the data and 'Correlation and Multiple Regression Analysis 'were used for compiling the results.

Findings: The findings of the study revealed that most of the respondents were in the age group of 26-35 years, post graduates with an income level of Rs. 40000 - 50000/- pm who were significantly motivated for entrepreneurship. This overall motivation had significant and positive relationship with all the factors, out of which most positive were 'Extra income generation', and 'Social recognition'.

Keywords: *overall motivation, women entrepreneurship, meerut city, extra income generation, social recognition.*

GJMBR-G Classification: *DDC Code: DDC Code: 658.42 LCC Code: HD2346.U5*

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Practical Implication: The study was highly practical being 'Women Entrepreneurship' had been the most sought transformation in recent times, especially in Indian context when there is an upsurge in overall entrepreneurship.

Originality/Value: The study was highly valuable because entrepreneurship is booming in India at a very high rate and the paper was original as it was based on primary data obtained from 250 (valid responses) of women entrepreneurs of Meerut City.

Keywords: overall motivation, women entrepreneurship, meerut city, extra income generation, social recognition.

I. Introduction

Entrepreneurship refers to the act of setting up of new business or reviving an existing business so as to take advantage of new opportunities. Thus, entrepreneurship shapes the economy by creating a new wealth and new jobs and by inventing new products and services. Entrepreneurial ability is an attitude to create something new, stand on it, and be persistent and overall dedication to achieving something. It is not only making money rather to add value in the entire socio-economic system for overall well-being (Matharu, 2016). Today India is witnessing a major development and growth in the area of entrepreneurship as a need of an hour is to create more jobs since 65% of the population is under of 35 years. Women entrepreneurs are playing a significant role in this growth and development being there has been an increasing trend in women taking up new ventures due to the changing face of social economic environment in India (Ramdas & Patrick, 2020). They are highly motivated towards taking risks and dare to innovate. There are numerous motivating factors like security, independence, commitment to success, passion in business, extra income generation, etc., which influences the women entrepreneurship (Karnreungsiri & Praditsuwan, 2017). Women are considered as strong entrepreneurs in present era due to their strong determination, dedication, achievement orientation and utmost desire to create value in the economic development of a nation (Khan et al., 2021). Further, it is found that immense gap is available in all the pertaining studies, in respect to the demonstration of key and relevant factors influencing the overall motivation of women entrepreneurship in current entrepreneurial scenario in India and also the studies are just confined to limited regions or areas. Hence this paper is an attempt to answer the basic questions as:

- What are the significant factors which influence the motivation of women towards entrepreneurship?
- What is the impact of these influencing factors in overall motivation of women entrepreneurs?
- What is the relationship among these influencing factors?

To answer the above questions, an empirical assessment has been done in Meerut city of Uttar Pradesh, India by conducting the survey of female entrepreneurs. Meerut city in western UP is one of the most prominent economic, social, educational and financial hubs. It is the part of NCR (National Capital Region) and with the advent of 'Metro and Rapid Rail', the trade and industrial development is expected to take roundabout metamorphosis. Secondly, the research scholar belongs to Meerut City only and this study has been conducted as a model study for the further macro level research. Hence, selecting the Meerut city as a part of study is highly justified for this domain.

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II. Literature Review

The extensive literature and past studies were available related to women entrepreneurship, but for this particular study, specific research papers were considered to explore the key determinants or factors influencing the overall motivation of women entrepreneurship in the current entrepreneurial landscape of India. The brief overview of some of the significant studies had been presented in this section.

Banu (2020) studied the motivational factors and barriers for women entrepreneurship in Coimbatore, India. The study concluded that the women were highly motivated and interested in taking and undergoing the enterprise in the city and that interest must be fully considered for the women empowerment in the city.

Kumar & Patrick (2020) explored the motivational factors among the owners (women entrepreneurs) of the beauty parlors in Bengaluru city. It was found that there were various internal and external factors that motivated the women entrepreneurs for that business, however, it was a small enterprise (beauty parlor) but women were satisfied due to financial independence, social status, risk taking ability, learning and growth opportunities etc.

Solesvik et al. (2018) investigated the female entrepreneurs in Norway, Russia & Ukraine and through their in depth examination, they highlighted the various similarities and dissimilarities between the male and female led motivational factors for entrepreneurship required for economic development of any nation.

Roy and Manna (2017) examined the various motivational factors for women entrepreneurship in the Nadia district of West Bengal and highlighted that the females were opting for entrepreneurship to become an economically independent apart from sharing the responsibility of their husband and fulfilling the needs of the family.

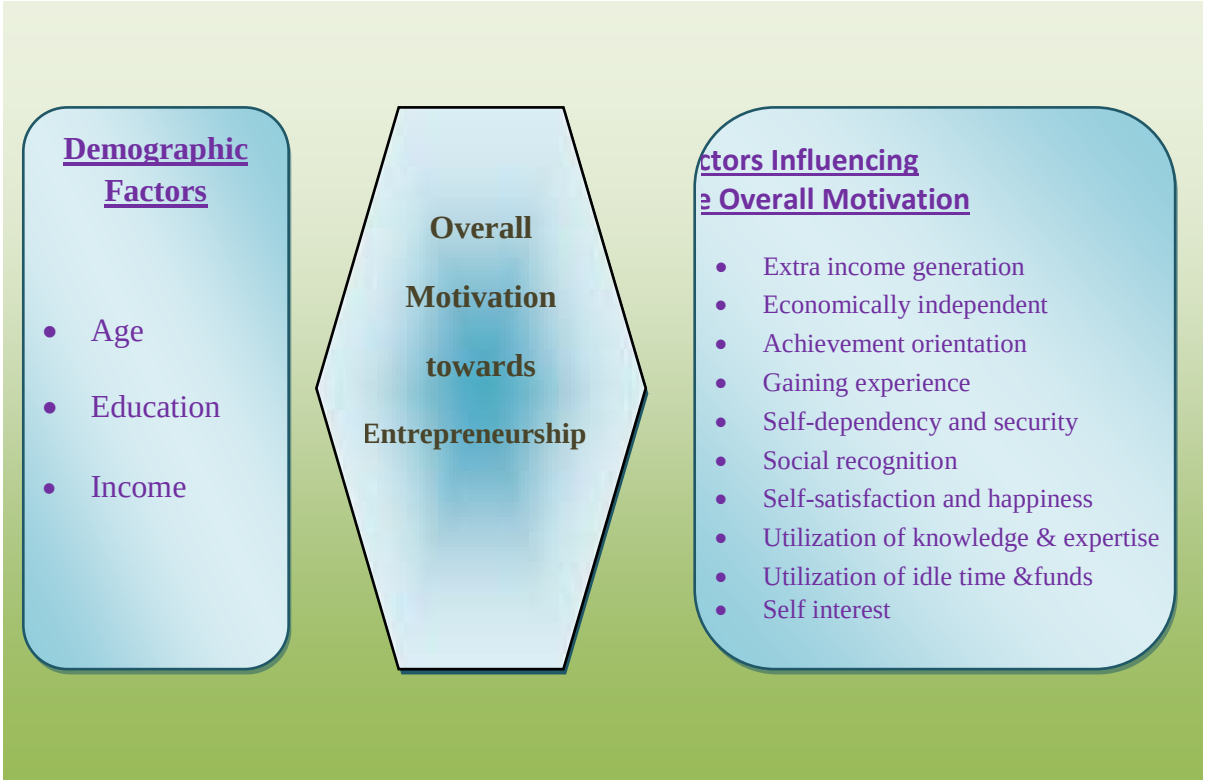
Karnreungsiri and Praditsuwan (2017) conducted the survey to study the motivational factors for women entrepreneurship in Thailand in the bakery business. It was found that the main motivating factors were the passion for the bakery business and income improvement of the women entrepreneurs. They were successful due to their product differentiation, innovation and personal ability to learn new things through the venture.

Geetha and Rajani (2017) explored the key motivating factors for the women to become an entrepreneur in Chittoor district of Andhra Pradesh, India. This study explored the key seven (out of sixteen) factors which motivated the women entrepreneurship and demonstrated that the role of women in the business enterprise was highly important in all dimensions.

Ahmad et al. (2016) explored the motivational factors for women entrepreneurship based on the psychological needs in Malaysia and it was found that the need for affiliation was the key motivating factor for them as they want them to be fully affiliated to some enterprise of their own.

Matharu (2016) in her survey, in Indore city identified the various reasons and encouragement factors for women entrepreneurship. This study had identified the ten motivational factors affecting the motivation of women taking up of new enterprises.

The availability of gap was analyzed in all the pertaining studies, with respect to the demonstration of specific and relevant factors influencing the overall motivation of women entrepreneurship in current entrepreneurial scenario in India. Also, it was found that the study of motivational factors was not covering the broader population in different regions of India especially in non-metros. Finally, the following conceptual model had been derived as a part of the study:



Source: Author's own formation on the basis of explored factors.

Figure1: Conceptual Framework of the Study

III. Research Objectives

- To explore the various factors influencing the overall motivation of women towards entrepreneurship in Meerut City.
- To demonstrate the relationship among various factors influencing the overall motivation of women towards entrepreneurship in Meerut City.
- To ascertain the most significant influencing factors contributing towards women entrepreneurship.

IV. Research Hypothesis

Research hypothesis for the study has been formed and depicted as overall motivation of women (the respondents) entrepreneurship is not significantly related to them:

H01: Extra income generation.

H02: Becoming economically independent.

H03: Achievement orientation.

H04: Gaining experience.

H05: Attaining self-dependency and security.

H06: Obtaining social recognition.

H07: Self-satisfaction and happiness.

H08: Utilization of knowledge and expertise.

H09: Utilization of idle time and funds.

H010: Self-interest.

V. Methods and Materials

In the first stage, the secondary data related to key motivational factors influencing the women entrepreneurship were explored with the help of research papers in esteemed journals. Around ten factors were identified which influence the overall motivation of respondents towards entrepreneurship and further they were subjected to empirical assessment. These ten factors were explored (Exploratory Factor Analysis – EFA) and identifies the available empirical studies conducted till date related to the same studies. Apart from these ten factors, demographic factors like age, education and current income of the respondents were also considered. Structured questionnaire was designed and respondents were contacted physically (to increase the response rate). The total sample size was 300 respondents out of which total 250 valid responses were taken into consideration.

The 'Convenience Sampling Technique' was applied for the study. The sample size was chosen arbitrarily and sample unit was the women entrepreneur of Meerut City (UP) who was the owners of beauty parlous, boutiques, cosmetics and jewellery shops, food business etc. The intensity of the selected factors were rated by the respondents with the assistance of 5 point Likert's scale (1- Strongly Disagree, 2- Disagree, 3- Can't Say, 4- Agree, 5- Strongly Agree).

Reliability analysis was conducted by applying the Cronbach test among the 35 responses across ten items(questions) and it was found that the reliability of the questions were high being the Cronbach Alpha value was more than 0.80 (greater than 0.70) which means that respondents were not biased for any factor. Zero case exclusion also suggested that all the respondents were able to fill the survey efficiently and effectively. No missing values were found in the response sheet. This study was conducted as a model study by the researcher for her upcoming major research project. Complete data were collected in one month and entered in excel sheet with a proper coding. Finally, 250 valid responses were considered for the study with no missing values. Consequently, with the assistance of SPSS, tabulation (demographics), cross tabulation& descriptive statistics were performed to present the data. Correlation and multiple regression techniques were applied to hypothesis testing and reaching out to specific results.

Key research (influencing) variables with their description and measurement scale used in the study were as follows (Table 1):

Table 1: Research Variables

S. No.	Name of the variable	Description	Measurement Scale used
1	Age	Age of the Respondents	Nominal
2	Education	Education level of the Respondents	Nominal
3	Income	Income level of the Respondents	Nominal
4	Overall Motivation	Overall motivation of women towards entrepreneurship	Interval
5	A1	Extra income generation	Interval
6	A2	Economically independent	Interval
7	A3	Achievement orientation	Interval
8	A4	Gaining of experience	Interval
9	A5	Self-dependency and security	Interval
10	A6	Social recognition	Interval
11	A7	Self-satisfaction and happiness	Interval
12	A8	Utilization of knowledge and expertise	Interval
13	A9	Utilization of idle time and funds	Interval
14	A10	Self interest	Interval

Source: Author's own tabulation on the basis of Secondary data for fulfilling the research objectives.

It was clear from the above Table1 that the first three variables (age, education and income) were demographic factors and others were the key study factors. However, the variable named as 'Overall motivation' was a dependent factor and all other (A1 to A10) were the independent ones. As stated above, questions were asked in a statement form like I am motivated for entrepreneurship, I generate extra income through entrepreneurship, and Entrepreneurship makes me economically independent etc. Overall motivation was ranked as 1-Very Low, 2-Low, 3-Normal, 4-High, 5-Very High.

VI. Data Analysis & Interpretation

This data analysis and interpretation part has been divided into two parts as 'Tabulation of age, income, education, overall motivation & Descriptive Statistics of all variables' and 'Cross Tabulations'.

a) Tabulation of Age, Income, Education and Overall motivation for Entrepreneurship:

i. *Age of the Respondents*

Table 2: Age of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-25 Years	38	15.0	15.0	15.0
	26-35 Years	137	55.0	55.0	70.0
	36-45 Years	50	20.0	20.0	90.0

	46-55 Years	25	10.0	10.0	100.0
	Total	250	100.0	100.0	

Source: SPSS output on the basis of primary data.

ii. *Education Level of the Respondents*

Table 3: Education Level of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Intermediate or less	42	17.0	17.0	17.0
	Graduation	35	14.0	14.0	31.0
	Post-Graduation	143	57.0	57.0	88.0
	Above Post Graduation	30	12.0	12.0	100.0
	Total	250	100.0	100.0	

Source: SPSS output on the basis of primary data.

iii. *Income Level of the Respondents*

Table 4: Education Level of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 30000/- pm	27	11.0	11.0	11.0
	30001 to 40000/- pm	88	35.0	35.0	46.0
	40001 to 50000/- pm	110	44.0	44.0	90.0
	50001 and above	25	10.0	10.0	100.0
	Total	250	100.0	100.0	

Source: SPSS output on the basis of primary data.

iv. *Overall motivation for entrepreneurship*

Table 5: Overall Motivation for Entrepreneurship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low	5	2.0	2.0	2.0
	Low	20	8.0	8.0	10.0
	Normal	42	17.0	17.0	27.0
	High	123	49.0	49.0	76.0
	very High	60	24.0	24.0	100.0
	Total	250	100.0	100.0	

Source: SPSS output on the basis of primary data.

v. *Descriptive Statistics pertaining to all variables*

Table 6: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Age	250	1.00	4.00	2.2500	.83333	.694
Income	250	1.00	4.00	2.5300	.82211	.676
Education	250	1.00	4.00	2.6400	.90476	.819
Overall Motivation	250	1.00	5.00	3.8500	.94682	.896
A1	250	1.00	5.00	4.0200	.76515	.585
A2	250	3.00	5.00	4.2500	.67420	.455
A3	250	1.00	5.00	3.7000	1.02000	1.040
A4	250	2.00	5.00	4.2500	.70353	.495
A5	250	2.00	5.00	4.3400	.62312	.388

A6	250	2.00	5.00	4.0600	.73608	.542
A7	250	1.00	5.00	3.6200	1.17017	1.369
A8	250	2.00	5.00	4.1300	.63014	.397
A9	250	2.00	5.00	4.3500	.64157	.412
A10	250	1.00	5.00	4.1400	.72502	.526
Valid N (list wise)	250					

Source: SPSS output on the basis of primary data.

Interpretation: It is clear from Tables 2-6, that most of the respondents are in the age bracket of 25-35 years, post graduates and with the income level of around 40000/- pm. Mean values for all the key study variables are 3.8 to 4.1 which strongly indicates that all the respondents were overall motivated with the entrepreneurship and the business they are undergoing.

b) Cross Tabulations

i. *Cross Tabulations – Overall motivation to 'Entrepreneurship' with Age of the Respondents*

Table 7: Overall Motivation with 'Age' of the respondents

Count						
		Age				Total
		0-25 Years	26-35 Years	36-45 Years	46-55 Years	
Overall Motivation	Very Low	0	3	0	3	6
	Low	0	12	6	2	20
	Normal	5	29	5	3	42
	High	22	60	24	16	122
	very High	10	34	15	1	60
Total		37	138	50	25	250

Source: SPSS output on the basis of primary data

ii. *Cross Tabulations – Overall motivation to 'Entrepreneurship' with Income Level of the Respondents:*

Table 8: Overall Motivation with 'Income' of the respondents

Count						
		Income				Total
		Below 30000/- pm	30001 to 40000/- pm	40001 to 50000/- pm	50001 and above	
Overall Motivation	Very Low	0	4	2	0	6
	Low	0	6	11	4	21
	Normal	1	20	16	8	45
	High	17	38	53	10	118
	very High	9	19	29	3	60
Total		27	87	111	25	250

Source: SPSS output on the basis of primary data

iii. *Cross Tabulations – Overall motivation to 'Entrepreneurship' with Education Level of the Respondents*

Table 9: Overall Motivation with 'Education' of the respondents

Count						
		Education				Total
		Intermediate or less	Graduation	Post-Graduation	Above Post Graduation	
Overall Motivation	Very Low	0	1	4	0	5
	Low	2	3	12	2	19
	Normal	7	7	20	5	39

	High	22	18	72	8	120
	very High	18	18	29	2	67
Total		49	47	137	17	250

Source: SPSS output on the basis of primary data

Results & Discussions: It is obvious from Tables 7 to 9 that maximum respondents who are motivated for entrepreneurship lie in the age group of 26-35 years, post graduates and income level is around Rs. 40000/- pm.

VII. Key Results (Hypothesis Testing)

a) Correlation Analysis

The correlation coefficient is calculated to view the significant relationship between 'Overall motivation for entrepreneurship' and all others factors. The data are presented in Table 10:

Table 10: Correlation Analysis

		Overall Motivation	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Overall Motivation	Pearson Correlation	1	.701**	.245*	-.246*	.478**	.430**	.564**	.340**	.439**	.387**	.472**
	Sig. (2-tailed)		.000	.014	.014	.000	.000	.000	.001	.000	.000	.000
	N	250	250	250	250	250	250	250	250	250	250	250
	N	250	250	250	250	250	250	250	250	250	250	250
**. Correlation is significant at the 0.01 level (2-tailed).												
*. Correlation is significant at the 0.05 level (2-tailed).												

Source: SPSS output on the basis of primary data.

b) Regression Analysis

Though the 'Correlation Analysis' has demonstrated the vital results, but as a progression, 'Regression Analysis' through SPSS is conducted and composed of following four self-explanatory tables as Table 6.5.1 – 6.5.4.

i. *Variables Entered/Removed*

Table 11: Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	A10, A3, A9, A8, A2, A7, A6, A5, A1, A4[b]		Enter
a. Dependent Variable: Overall Motivation			
b. All requested variables entered.			

Source: SPSS output on the basis of primary data.

ii. *Model Summary*

Table 12: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.861[a]	.741	.711	.50857
a. Predictors: (Constant), A10, A3, A9, A8, A2, A7, A6, A5, A1, A4				

Source: SPSS output on the basis of primary data.

iii. *ANOVA Results*

Table 13: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	65.731	10	6.573	25.413	.000[b]
	Residual	23.019	239	.259		
	Total	88.750	249			
a. Dependent Variable: Overall Motivation						
b. Predictors: (Constant), A10, A3, A9, A8, A2, A7, A6, A5, A1, A4						

Source: SPSS output on the basis of primary data.

Interpretations: It is indicated from Table 6.5.2 and Table 6.5.3, that 74% of the variations in the dependent factor has been explained by all predictors. It is quite significant as the p value is .000.

iv. *Regression Coefficients*

Table 13: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.894	.599		1.493	.139
	A1	1.572	.189	1.270	8.313	.000
	A2	-.661	.111	-.471	-5.934	.000
	A3	-.110	.068	-.119	-1.636	.105
	A4	.536	.280	.398	1.916	.059
	A5	-.194	.204	-.127	-.948	.346
	A6	.085	.175	.066	.484	.629
	A7	-.028	.070	-.034	-.396	.693
	A8	.287	.108	.191	2.650	.010
	A9	.374	.177	.253	2.115	.037
	A10	-1.124	.261	-.861	-4.308	.000
a. Dependent Variable: Overall Motivation						

Source: SPSS output on the basis of primary data.

Results and Discussions: It is evident from Table 6.5.4 that the significant and positive, motivating influencing factor is 'A1 – Generating extra income' for women entrepreneurship, however the significant, but negatively impacting factors are 'A2 – Economically independent' and 'A10 - Self-interest'.

c) *Hypothesis Testing*

The correlation coefficients from above Table 10 indicate the positive correlation between all the variables to 'Overall Motivation'. Except A2 and A3, all other factors are significantly related to overall motivation hence:

- H01: Rejected ($p < 0.005$)
- H02: Accepted ($p > 0.005$)
- H03: Accepted ($p > 0.005$)
- H04: Rejected ($p < 0.005$)
- H05: Rejected ($p < 0.005$)
- H06: Rejected ($p < 0.005$)
- H07: Rejected ($p < 0.005$)
- H08: Rejected ($p < 0.005$)
- H09: Rejected ($p < 0.005$)
- H10: Rejected ($p < 0.005$)

It demonstrates that women entrepreneurship is not highly motivated with achievement orientation and being their economically independent (already their spouse are earning). However, they are highly motivated for extra income generation and receiving the social recognition (highly positive correlation as Pearson Correlation Coefficient value > 0.5)

VIII. Conclusion

The current study states that the overall motivation of women taking up of enterprise and undergoing business activities in the concerned area of

study is quite high and an optimistic paradigm. Demographically, most of the women who are involved in enterprising efforts are middle aged (26-35 years), completed their post-graduation and earning around forty thousand to fifty thousand per month. Women entrepreneurs are mostly motivated by the internal factors supported by the other studies as well, however these internal factors implicitly transformed into the external factors being every business activity undertaken leads to the value addition to the economic growth and development of a nation.

Furthermore, the results of correlation and regression analysis highlighted the positive relationship of overall motivation of women entrepreneurship to all the factors considered, however the most positive relationship are with the generating extra income and attaining the social recognition of women through taking up of the enterprise. There have been a significant influence of generating extra income, gaining of experience in business, being self-dependent, attaining social recognition, self-satisfaction and happiness, utilization of knowledge and expertise, utilization of idle funds & time and self-interest on the overall motivation of women taking up of entrepreneurship. Hence it has been quite evident from this study that women are highly motivated for taking up of entrepreneurial activities for being self-reliant and obtaining more and more social recognition by adding an extra income for themselves and their family.

IX. Limitations and Scope for Future Research

The study has undergone certain limitations as availability of highly comprehensive and extensive pool of literature related to 'Motivating factors for entrepreneurship' which was highly impossible to cover in such a short span of research time. Furthermore, the convenience sampling method with relatively small sample to be covered a restricted time frameand reluctant& hesitant attitude of respondents while providing responses had provided an obstacle for this study. Hence, it could be stated here that there is an immense scope for future research in this domain being 'Women entrepreneurship' was predicted as the most prominent transformation. This research study could be conducted with increasing the sample size and in other cities of India as well, however it adds value to the current literature of empirical evidences in the respective domain.

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Decision Making in Determining the Best Field Development Scenario using Analytical Hierarchy Process (AHP): Case Study of SANDHIGH Field

By Benny Nugroho Ardhiansyah & Santi Novani

Abstract- The SANDHIGH field is one of the fields owned by PT Pertamina EP in West Java. This field was discovered in 1987 and is a gas-producing field with peak production reaching 45-50 mmscfd in 2002-2003 and cumulative gas production up to December 2020 reaching 200.1 BSCF. Gas production from this field has decreased drastically after 2003, until March 2022, the production is only under one mmscfd, an apprehensive condition. Problem analysis has been carried out using the Kepner-Tregoe method. The leading potential cause of the decline in production in this field is the absence of a Plan of Development (POD). So, exploitation activities that aim to increase production cannot be carried out or even restrain the decline rate in production. In mid-2021, an initiation was made to make the SANDHIGH field POD by involving the Subject Matter Expert (SME) from the subsurface and surface engineers and advisors. Discussions with SKK Migas as government representatives were also carried out intensively to produce the best development scenario based on Value Focus Thinking (VFT). From these discussions emerged three alternative development scenarios. The Analytical Hierarchy Process (AHP) method is used to help select the best scenario from the three available options.

Keywords: *SANDHIGH field, plan of development, AHP analysis.*

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Decision Making in Determining the Best Field Development Scenario using Analytical Hierarchy Process (AHP): Case Study of SANDHIGH Field

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I. Introduction

PT Pertamina EP is one of the largest gas producers among Sub Holding Upstream of PT Pertamina (Persero) subsidiaries. One of the gas-producing structures is the SANDHIGH Field. It is geographically located in West Java (Appendix-1). NorthCILA, EastCILA, and BaGung border the northwest. SANDHIGH field is proven to produce oil and gas after the SH-01 exploration drilling was carried out in 1987 from the P prospect. At its peak production, the SANDHIGH field can produce a gas of 45-50 mmscfd with a cumulative total gas production up to December 2021 of BSCF, which is a large enough gas for a field measuring only 5x3 km. However, until this year, the field's production has plunged to its lowest point of just under 1 mmscfd.

Efforts to increase production from the SANDHIGH field must include additional drilling wells in new areas around this field. However, company regulations require a field to have a Plan of Development (POD) and Final Investment Document (FID) as the basis for developing an oil and gas field. The main problem with this field is that it does not have the POD & FID document. Therefore, in the end of 2021, it was initiated to create the SANDHIGH field POD & FID document, which includes several field development scenarios. Then one best scenario must be selected, which will be applied in field development.

Gas production from the SANDHIGH field has decreased drastically from 2006 to 2022. A comprehensive plan for the development scenario is needed to increase gas production in this field. Selection of the optimal field development scenario is the essential step. In the SANDHIGH field case, a study of the subsurface potential and the needs of production facilities was carried out. Based on Forum Group Discussion within subject matter expert, conical on 3 alternative scenarios including:

1. 1 Workover, 2 Infill drilling, 2 step-out drilling + handling condensate with pipeline in 2033-2035
2. 1 Workover, 2 Infill drilling, 2 step-out drilling + handling condensate with trucking in 2033-2035
3. 1 Workover, 2 Infill drilling, 2 step-out drilling + only produce gas until 2033

This study will select the best scenario applied to the SANDHIGH field using the decision-making methods. It is hoped that SANDHIGH field gas production can increase and provide additional company revenue

Decision-making in the development plan related to the SANDHIGH field uses Value Focused Thinking (VFT) and Analytic Hierarchy Process (AHP). The decision alternatives were made based on the

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Forum Group Discussion results as explained in the previous section, while the criteria chosen for consideration are: cost, expected profit, time to implement, operability, and safety. The four criteria mentioned before will be considered to choose the best alternative from the three development scenario options mentioned earlier.

II. Methods

A POD/FID document provides a field development strategy divided into two sections, discussing the subsurface potential and surface facility development. In the end of 2021, a focus group discussion was held with Subject Matter Experts (SMEs) from various related fields and scientific backgrounds. The problem will be solved by generating alternatives utilizing the Value Focused Thinking (VFT) method.

On the subsurface, sensitivity analysis was performed on numerous possible workovers and drilling scenarios to determine their cumulative effect on gas production, as illustrated in appendix-2. Based on the subsurface modeling performed by SMEs in the subsurface field, it was determined that adding one workover, two infill drilling, and two step-out drilling is the most optimal solution. As a result, there is only one subsurface alternative.

The surface facility analysis becomes more complicated than subsurface since there are multiple viable methods for transporting gas and liquid production from the west area to the east area gathering station. The other issue is how to handle liquid production at the existing production facility where there is no such facility yet. In every scenario, the construction of a flowline from the west to the east is a solid solution, the only difference being handling liquid production after 2033. The following are the alternatives that resulted:

1. Scenario-1 (liquid handling by pipeline to the SBG Station)
   In this scenario, the following production facilities will be constructed: Production using existing facilities in the east area; construction of flowline from west area to east area; adding separation facilities, storage tanks, and water injection plans in the eastern area in 2031; construction of a condensate trunkline from the production facility in the east area to the SBG station, which is 18 km
2. Scenario-2 (liquid handling by trucking to the JAS Station)
   In this scenario, the following production facilities will be constructed: production using existing facilities in the east area; construction of flowline from west area to east area; adding separation facilities, storage tanks, and water injection plans in the eastern area in 2031; rent a road tank from the production facility in the east area to the JAS station, which is 25 km
3. Scenario-3 (No liquid handling, only producing gas until 2033)
   In this scenario, the following production facilities will be constructed: production using existing facilities in the east area; construction of flowline from west area to east are

Value-Focused Thinking aids in the discovery of hidden objectives and results in more productive collecting information. It can facilitate communication between parties affected by a decision, facilitate the involvement of various stakeholders, and facilitate the coordination of related decisions. Addressing underlying values would result in a more nuanced alternatives assessment and improved communication amongst stakeholders (Keeney, 1994).

With the Value-Focused Thinking (VFT) process beginning with fundamental objectives, specifying values (criteria), identifying all possible alternatives/ criteria, evaluating those alternatives/criteria, and finally selecting the best alternative/criteria. In appendix-3 illustrates how the alternatives are generated for the case.

The most critical and significant criteria affecting the decision analysis must be chosen to determine the best alternative when making a decision. The developed alternatives must meet the primary objectives of selecting the best field development scenario for increased production and safer operation. However, various criteria and sub-criteria will determine the optimum scenario. The primary criterion is cost-benefit analysis. Costs are divided into CapEx and OpEx, whereas benefits are divided into expected profit, implementation time, operability, and safety. Multiple criteria and sub-criteria will be used in the AHP process to identify the best alternative among three development scenarios for increasing gas production in the SANDHIGH Field. AHP consists of several stages, as described in the appendix-4.

Thomas L. Saaty developed AHP as a decision support model. This decision support approach will use a hierarchy to classify complex multi-factor or multi-criteria problems. The term "hierarchy" refers to depicting a complicated problem in a multi-level structure, with the objective at the top, followed by factors, criteria, sub-criteria, and the final level of alternatives. A complex problem can be split into groups and organized hierarchically to appear more ordered and systematic (Saaty, 2008).

Step-1

The AHP method begins by constructing a decision hierarchy that depicts the link between alternatives and criteria/sub-criteria. Appendix-5 depicts the decision hierarchy tree.

Step-2

This stage is carried out by conducting interviews with SME, a member of the FGD, to

determine the root of the problem and alternative solutions along with the criteria used in determining the best development scenario. In this interview process, an objective assessment of each SME is obtained, which helps make pairwise comparisons. Six experts were interviewed during the prioritization process to determine the number of times more significant or dominant an alternative is compared to another alternative using a specified criterion. A similar technique is used to provide judgments on sub-criteria, and the prioritization procedure is conducted using a 1-9 numerical rating scale. The following is a list of the SMEs that were interviewed for this study:

Table 1: The members of Subject Matter Expert

No.	Name	Position	Background Study	Experience
1	WW	Subsurface Development Manager Area-1	Petroleum Engineering	20 years
2	BNA	Sr G&G Engineer	Geophysics	15 years
3	LFD	Sr Reservoir Engineer	Petroleum Engineering	17 years
4	AFF	Sr Surface Facility Planning Engineer	Civil & Construction Engineering	18 years
5	BA	Sr Development Planning Analyst	Petroleum Engineering	12 years
6	AH	Sr Drilling Engineer	Mechanical Engineering	18 years

As input in the pairwise comparison process, a questionnaire is made, used as material for interviews with each SME. The questionnaire contains the 1 to 9 scale used in AHP as the numerical rating for the prioritization process. The description of each value scale is given in Table-4.

Table 2: Numerical rating of pairwise comparisons

Numerical Rating	Verbal Judgments
1	Equally preferred
3	Moderately more preferred
5	Strongly more preferred
7	Very strongly more preferred
9	Extremely more preferred

Six experts were interviewed throughout the discussion to judge how much preferred, or essential one alternative is compared to another alternative based on a given criterion. This technique was also used to prioritize sub-criteria and criteria. Following that, the geometric mean is calculated to obtain the average value among the experts.

As in the previous explanation, the pairwise comparison is conducted to assess which alternative is more important. This step is also carried out to prioritize each criterion and sub-criteria. The following are pairwise comparisons which are the results of the assessments of the six interviewed SMEs

a) Cost VS Benefits (prioritization between criteria)

At this stage, it aims to prioritize the two main criteria used as the basis for evaluating alternative solutions. The two criteria are costs and benefits. The cost criteria are further divided into two sub-criteria: capital expenditure (CapEx) and operational expenditure (OpEx). While the criteria for benefits are divided into four sub-criteria, namely expected profit, time to implement, operability, and the last is safety. Each SME was asked to prioritize costs compared to benefits at the interview stage. Appendix-6 are the results of the interview.

From the results of the interview, pairwise comparisons were then made as summarized in Table-3 as follows:

Table 3: Pairwise comparisons of main criteria (cost vs benefits)

Cost VS Benefits	Cost	Benefits
Cost	1000	0.151
Benefits	6.618	1.000
Total	7.618	1.151

From the results above, all SMEs agree that "benefits" are prioritized over "costs." Because from the perspective of PT Pertamina EP as a company with a Production Sharing Contract (PSC) scheme with SKK Migas. The state will reimburse all costs through a cost recovery mechanism. Therefore, this project's decision-making prioritizes the "benefits" aspect rather than the "cost." In addition, the sub-criteria in "benefits" is indeed an important aspect that must be considered in deciding whether this project can be implemented or not.

b) Cost Attribute

i. *CapEx vs OpEx (sub-criteria weighting)*

The first question on the cost attribute prioritizes the two sub-criteria, namely CapEx and OpEx. CapEx is all costs used for investments such as the construction of production facilities, construction of flowlines, land acquisition for drilling, and drilling materials. While OpEx

is all costs needed to run daily operations, such as maintenance costs, rental fees, employee salaries, and other expenses required to run the operations of each alternative. The results of this interview are helpful as a weighting sub-criteria. Appendix-7 are the results of the interview.

From the results of the interview, pairwise comparisons were then made as summarized in Table-4 as follows:

Table 4: Pairwise comparisons of cost attributes (CapEx vs OpEx)

CaPex VS OpEx	CaPex	OpEx
CaPex	1.000	5.288
OpEx	0.189	1.000
Total	1.189	6.288

The interview results show that CapEx is prioritized over OpEx because the return of CapEx with a cost recovery mechanism can be done faster than OpEx. Besides that, OpEx will directly affect oil and gas lifting costs, which will reduce the company's profit.

ii. *CapEx*

SMEs were interviewed about their preferences or the relative importance of several alternatives in CapEx costs. It was graded from least expensive to the most expensive alternative. Appendix-8 are the results of the interview:

Furthermore, a pairwise comparison was made based on the results of the interview above with the following results:

Table 5: Pairwise comparisons of CapEx

CaPex	Skenario-1	Skenario-2	Skenario-3
Skenario-1	1.000	0.333	0.143
Skenario-2	3.000	1.000	0.200
Skenario-3	7.000	5.000	1.000
Total	11.000	6.333	1.343

Scenario-3 is the scenario with the lowest cost of CapEx. This alternative only produces gas until 2033 using existing production facilities without the construction of additional facilities. Meanwhile, other scenarios require additional costs to construct a new liquid flowline from existing facilities to other fields or rent a road tank.

iii. *OpEx*

Similar to CapEx, in this OpEx sub-criteria, SMEs are asked to rate which scenario has a lower OpEx fee than the other scenarios. Priorities are arranged based on the cheapest to the most expensive OpEx costs. In appendix-9, the results of the assessment by SMEs on these sub-criteria are given.

The interview results above are then stated in a pairwise comparison, as shown in Table-6 below.

Table 6: Pairwise comparisons of OpEx

OpEx	Skenario-1	Skenario-2	Skenario-3
Skenario-1	1	0.200	0.143
Skenario-2	5	1	0.333
Skenario-3	7	3	1
Total	13.000	4.200	1.476

The scenario with the lowest OpEx costs is Scenario-3 because this scenario only takes into account OpEx until 2033, the impact of gas production being stopped only for that year. Meanwhile, the total OpEx calculation is up to 2035 or the end of the PT Pertamina EP PSC contract period in another scenario.

c) Benefits Attribute

i. *Expected profit VS Time to implement VS Operability VS Safety (sub-criteria weighting)*

As was done in the "cost" attribute interview, for the first time, SMEs are asked for opinions regarding the priorities of the four existing sub-criteria, namely expected profit, time to implement, operability, and safety. The results of this interview will be used as a weighting sub-criteria in the subsequent analysis.

Expected profit is the estimated profit that the company will get in each scenario. Time to implement is the estimated time required to complete the project and start providing revenue for the company. Operability or level of complexity is the ease and flexibility of the operation process of each alternative. Safety is a risk related to work safety and environmental sustainability. Appendix-10 are the results of the interview:

Furthermore, from the results of the above interview, a pairwise comparison was made, as summarized in the table-7 below.

Table 7: Pairwise comparisons of sub-criteria in "benefits"

Benefits	Profit	Time to Implement	Operability	Safety
Profit	1.000	5.000	3.000	0.333
Time to Implement	0.200	1.000	0.333	0.143
Operability	0.200	3.000	1.000	0.200
Safety	3.000	7.000	5.000	1.000
Total	4.533	16.000	9.333	1.676

All SMEs agree that safety is the primary concern for field development scenarios. This aligns with the company policy that prioritizes occupational health and safety and caring for others, the social and natural environment as a way of life. The next priority in a row is expected profit, operability, and finally, time to implement.

ii. *Expected profit*

SMEs were interviewed about their preferences or the relative importance of several alternatives in expected profit. It was graded from the highest to the lowest profit. Here are the results of the interview:

The interview results above are then stated in a pairwise comparison, as shown in the table-8 below.

Table 8: Pairwise comparisons of expected profit

Profit	Skenario-1	Skenario-2	Skenario-3
Skenario-1	1.000	0.306	4.217
Skenario-2	3.267	1.000	6.257
Skenario-3	0.237	0.160	1.000
Total	4.504	1.466	11.474

It can be seen that the scenario that provides the most considerable profit for the company is scenario-2 because the maximum oil and gas production is obtained until 2035 (end of PSC) and does not develop a flowline for liquid produced in 2033-2035. Liquid production is transferred to the JAS station by renting a road tank.

iii. *Time to implement*

For the sub-scenario of time to implement, SMEs are asked to assess the priority of each scenario based on the length of time required to complete the project to generate revenue for the company. The assessment is carried out in time from the shortest to the longest. The results of the interview can be seen in appendix-12.

As with the other sub-criteria, a pairwise comparison was made after the interview, as shown in the table-9.

Table 9: Pairwise comparisons of time to implement

Time to Implement	Skenario-1	Skenario-2	Skenario-3
Skenario-1	1.000	0.218	0.143
Skenario-2	4.592	1.000	0.306
Skenario-3	7.000	3.267	1.000
Total	12.592	4.484	1.449

Scenario-3 is the scenario that has the fastest time in project completion because this scenario does not involve building a liquid flowline and leasing a road tank. The scope of work in scenario-3 is only to construct a flowline from the west area to the east area, while production facilities use existing facilities.

iv. *Operability*

SMEs were surveyed regarding their preferences or the relative importance of numerous alternative scenarios in operability. This criterion determines how adaptable and straightforward an operation or facility is. It was ranked from simplest to most complex operation. Appendix-13 are the interview's findings:

The following are pairwise comparisons for operability obtained from the interview results above.

Table 10: Pairwise comparisons of operability

Operability	Skenario-1	Skenario-2	Skenario-3
Skenario-1	1.000	3.267	0.237
Skenario-2	0.306	1.000	0.184
Skenario-3	4.217	5.433	1.000
Total	5.523	9.700	1.421

Same with the time to implement sub-criteria, for operability scenario-3 is also the most straightforward scenario in operation for the same reason. In terms of work, scenario-3 is the easiest because it only involves making a flowline from the west area to the east area.

v. *Safety*

The last sub-criteria is safety, where in this aspect, SMEs are asked to estimate the potential hazards, work accidents, and environmental pollution from each scenario and then make priorities based on the safest to the most dangerous scenarios, as seen in the results of the interview in appendix-14.

Then, as detailed in table-11 below, a pairwise comparisons table is created.

Table 11: Pairwise comparisons of safety

Safety	Skenario-1	Skenario-2	Skenario-3
Skenario-1	1.000	3.267	0.237
Skenario-2	0.306	1.000	0.184
Skenario-3	4.217	5.433	1.000
Total	5.523	9.700	1.421

Once again, scenario-3 is the winner because this scenario is considered the safest, both in terms of potential work accidents and environmental pollution.

III. Synthesize the Result

This is the third step in the AHP process, in which the alternatives are prioritized. Synthesizing the results entails calculating the consistency ratio and ranking the alternatives. It begins by normalizing the pairwise comparison matrices and averaging each row to obtain the relative priority or Eigen vector for each criterion/sub-criteria.

While synthesizing the results, it is critical to check the degree of consistency of judgments

(consistency ratio) to ensure the ultimate decision is of high quality. A consistency ratio is generated to quantify the consistency of paired comparison judgments. The ratio is designed if the ratio values are greater than 0.10, indicating that the judgment is inconsistent and cannot be accepted. As a result, confirmation from SMEs that the consistency ratio is less than 0.10 must be acquired. For pairwise comparison matrixes with more than two rows/columns, the consistency ratio must be determined. The steps for calculating the consistency ratio are as follows:

1. Normalize the pairwise comparison by dividing each element in the pairwise comparison by the total number of all elements in the same column.
2. Make sure the sum of all normalized pairwise comparison elements in the same column is worth one.
3. Calculate the average in each row, and make this average value as an "eigenvector."
4. Calculate the matrix multiplication between the eigenvector values and each pairwise comparison element in the same column. The first-row eigenvector is multiplied by all elements of the first column in pairwise comparison, and so on.
5. Do the summation of the matrix results from Step 4. Furthermore, this result is called the "weighted sum."
6. Divide each weighted sum value by the eigenvector value.
7. Calculate the average of all the values obtained from Step 6. Then this value is called λmax.
8. Calculate the Consistency Index (CI) using the equation below:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Where n is the number of items being compared

9. Calculate the Consistency Ratio (CR) using the equation below:

$$CR = \frac{CI}{CR}$$

Where RI is the Random Index, which is the consistency index of a randomly generated pairwise comparison matrix. It can be shown that RI depends on the number of elements being compared and takes on the following values

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

The following are the results of the consistency ratio calculation for each criterion and sub-criteria.

Table 12: Consistency ratio of criteria and sub-criteria

Criteria	CR	Sub-Criteria	CR
Cost	-	CapEx	0.057
		OpEx	0.056
Benefits	0.044	Profit	0.061
		Time to Implement	0.057
		Operability	0.085
		Safety	0.085

We can conclude from the calculation that all CRs are less than 0.1, indicating that all data are already consistent. The technique can be continued to get the alternative's ranking rate. The hierarchy tree in appendix-15 illustrates the weights assigned to all alternatives and criteria/sub-criteria.

The last step in AHP is to do priority ranking. The ranking rate of alternatives is calculated by multiplying all of the weights in each path and then summing the options' results. The scenario with the highest score is the selected scenario.

Table 13: Summary of the AHP calculation result

Criteria			Sub-Criteria				Alternatives					
							Scenario-1		Scenario-2		Scenario-3	
	Weight	CR		Weight	Normalized	CR	Weight	Normalized	Weight	Normalized	Weight	Normalized
Cost	0.131	-	CapEx	0.841	0.110	0.057	0.083	0.009	0.193	0.021	0.724	0.080
			OpEx	0.159	0.021	0.056	0.074	0.002	0.283	0.006	0.643	0.013
Benefits	0.869	0.044	Profit	0.263	0.229	0.061	0.266	0.061	0.061	0.149	0.083	0.019
			Time to Implement	0.057	0.049	0.057	0.076	0.004	0.266	0.013	0.658	0.033
			Operability	0.122	0.106	0.085	0.228	0.024	0.096	0.010	0.676	0.072
			Safety	0.558	0.485	0.085	0.228	0.111	0.096	0.047	0.676	0.328
								0.210		0.246		0.544

Based on the decision analysis above, it can be stated that Scenario-3 is the best alternative strategy for resolving the issue of decreased gas production in the SANDHIGH Field by utilizing a combination of VFT and AHP. Scenario-3 is envisioned as a project that would utilize existing production facilities in the east area and include the construction of a flowline connecting the west and east areas.

IV. Conclusion

Based on all the discussions carried out, the following conclusions can be drawn from this research:

1. Based on the focus group discussion with multi-disciplinary SMEs, selection of the best development scenario based on cost and benefit analysis. The cost criteria are divided into two sub-criteria, namely CapEx and Opex. Meanwhile, the benefit criteria are divided into four sub-criteria: expected profit, time to implement, operability, and safety.
   Based on the AHP analysis, the benefit has a higher weight than cost, with a numerical value of 0.869 for benefit and 0.131 for cost, respectively. Cost is not a priority because PT Pertamina EP has strong financial support from the state as a subsidiary of a state-owned company. Investment decisions are more focused on how much benefit the company will get. On the cost criteria, CapEx has a higher weight than OpEx, with a numerical value of 0.841 for CapEx and 0.159 for OpEx. Meanwhile, the priority benefit criteria resulting from the AHP analysis are safety (0.558), expected profit (0.263), operability (0.122), and time to implement (0.057).
2. The best scenario chosen is scenario-3, with a weight of 0.544. This scenario is superior to the other two scenarios, namely scenario-2 with a value of 0.246, and the last priority is scenario-1 with a value of 0.210.
   In scenario-3, There are two infill drilling, two step-out drilling, Production using existing facilities in the east area, and the construction of flowline from the west area to the east area. This scenario will provide additional cumulative gas gross production of 25.6 bscf.

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Changing the Conversation on Energy Transition

By Miguel Schloss

Combating Climate Change: Words or Deeds?- Advertising helps, but doesn't trigger progress

Quis custodiet ipsos custodes? (Who watches the watchers?)

Who would have thought that after 30 years since the UN Convention on Climate Change, the gap between the agreed goals, and delivery on them remains so wide, and that consequently global warming continues unabated?

Except for the decrease in CO_2 emissions in 2020, resulting from the economic crisis of the time, emissions remain essentially the sameas those prevailing before the pandemic, reflecting stagnant levels for more than 20 years. With lackluster economic performance, skyrocketing energy prices and turbulent supply chains, it shouldn't be surprising that we may have another year of stagnant CO_2 emissions, which may revert as soon as economic activity recovers.

Keywords: carbon emissions, aligning interests, efficiency, affordability, sustainability.

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I. Combating Climate Change: Words or Deeds?

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Except for the decrease in CO_2 emissions in 2020, resulting from the economic crisis of the time, emissions remain essentially the sameas those prevailing before the pandemic, reflecting stagnant levels for more than 20 years. With lackluster economic performance, skyrocketing energy prices and turbulent supply chains, it shouldn't be surprising that we may have another year of stagnant CO_2 emissions, which may revert as soon as economic activity recovers.

With current known technologies, policy approaches and institutions involved, the goals agreed by the international community for mid-century are not going to be met. The Inter-governmental Panel on Climate Change (IPCC) has been indicating that to limit warming to 1.5 ° C from preindustrial times, carbon emissions needed to decline 45 percent by 2030. They did not say that the world would end, nor that civilization would collapse, if temperatures were to rise above 1.5 ° C. [i]

Moreover, in the fourth assessment report, the IPCC projected that by 2100, the global economy would be three to six times larger than it is today, and that the costs of adapting to a high (4° C) temperature rise would reduce gross domestic product (GDP) just 4.5 percent, which surely does not sound like the end of the world. ‘

In this connection, the IPCC has noted that “there is robust evidence of disasters displacing people worldwide, but limited evidence that climate change or sea level risks is the direct cause”. [ii]

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This is not to say that climate change does not require proper attention and priority, but that there are other drivers, such as low socio-economic development or limited capabilities of the state, that are judged to be just as to be equally if not substantially more influential in current and associated imbalances. [iii]

Hitherto the approach to the issue has tended to rely on setting targets for carbon emission reductions and pledging resources to achieve them. Governments have focused on top-down regulatory mandates reliant on poorly grounded views of our future, without offering good answers to what needs to be done to reverse past trends.

While such concerns have a valid place in policy and technical debates, caring and protecting the environment must also achieve universal prosperity for all — both objectives are mutually supportive and absolutely indispensable.

Polarizing discussions between emission reductions vs. economic well-being, essentially deflected attention from reconciling both objectives. The focus must shift towards paying attention to the incentives to align interests towards sustainability, efficiency, and emerging societal demands - not as abstract aggregates, but as a way of achieving economic solutions.

If incentives are right and the business is profitable, investments will flow, and carbon mitigation is going to take a hold. Efforts cannot rely exclusively on government pressures – increasing guidelines, clearance of environmental mitigation programs, setting targets, tracking compliance arrangements. On their own, they tend to stray from the interests of producers and consumers alike – the ultimate beneficiaries of sound environmental policies.

Institutional constraints, costly and time-consuming processes that oftentimes have their share of discretionary powers among regulatory agencies, can easily generate bureaucracy and conditions for corruption, as happens in other fields where anti-trust legal reforms are under consideration, where “gatekeepers” tend to prevent competitive practices through costly clearance procedures. [iv] For these reasons, having enabling conditions, with appropriate competition aimed at attracting enterprises, will be necessary for serious and scalable decarbonization.

That said, the recent UN Climate Change Conference of the Parties (COP) meeting, represented for the first time a welcome (albeit timid) dose of realism. Gone were the all-too-frequent rhetorical

pronouncements about the dangers heralding the pending crisis to humanity and the self-congratulatory declarations celebrating new promises to avert such a disaster.

There was moderate recognition that the world was on the way to a rise of 2.7° C towards global warming, while experts estimate that the outlined plans could produce a trajectory of between 1.8° C and 2.4° C increase.

Consequently, taken pledges at face value, the target in the original agreements of 1.5 ° C is still in force, but barely, and it has therefore been agreed to review the commitments by the end of 2022 to steer plans for a 1.5° C warming.

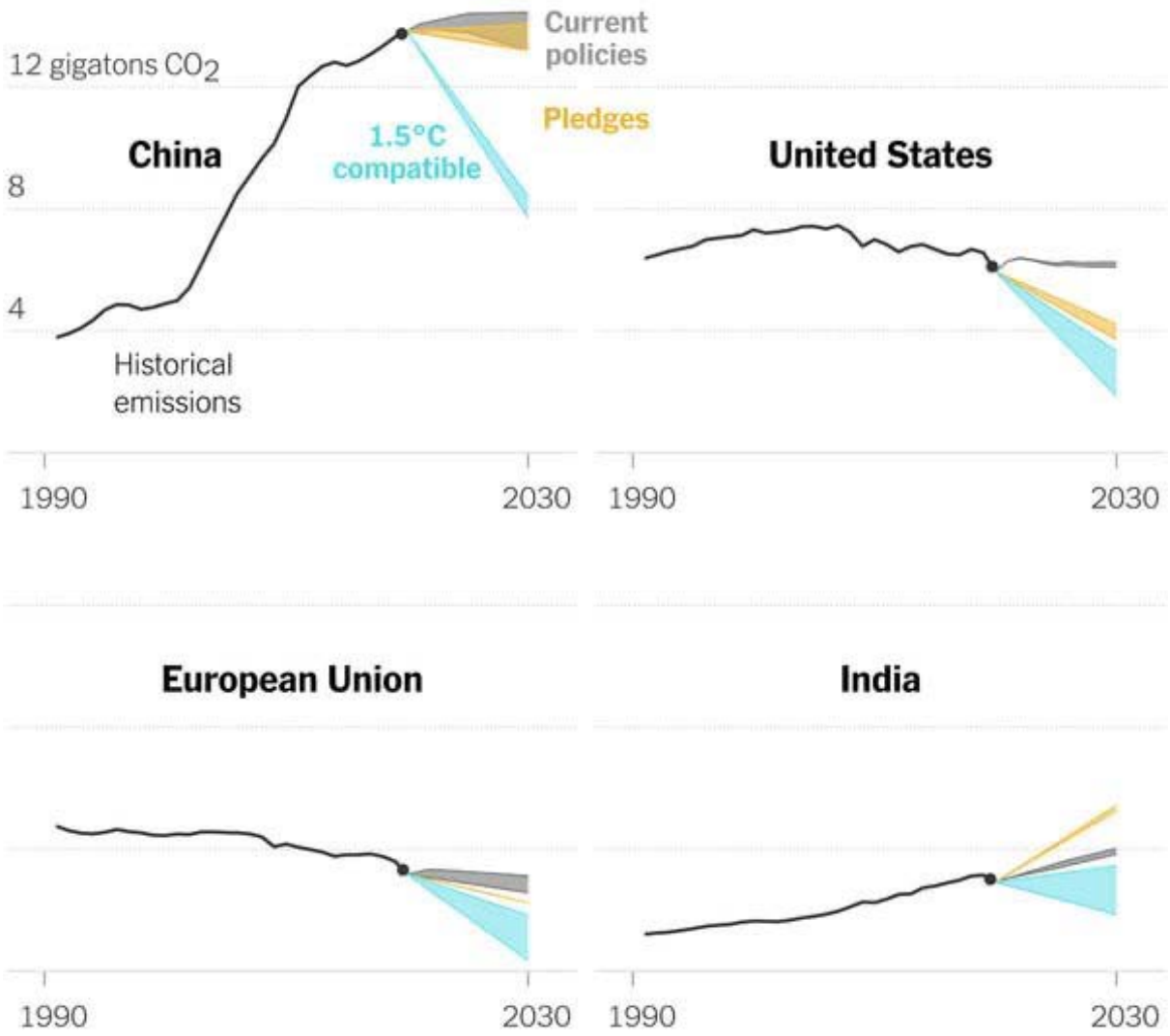
An effort of this magnitude requires a change of pace of historical proportions for energy policies and an investment of at least $ 16.5 trillion. These magnitudes will require a profound transformation in production and transportation practices, investments in renewable energy and efficiency, as well as carbon capture and storage, which at present are for the most part in their infancy [v]

Adding up pledges and programs, recent COP proceedings suggest that more than 100 countries pledged to reduce methane emissions, and another100 gave committed to ending deforestation.

A few major countries outlined plans to accelerate their shift to renewables, the bottom line is that numerous G20 countries, where volume counts, are not yet on a trajectory to reach their stated net-zero goals.

But in all, major gaps persist in achieving the right trajectory to achieve the internationally agreed targets.

This can be seen in the depiction below, showing the difference between projected emission trajectories with current policies and those to achieve the 1.5 °C goals:



Politically, it will be difficult to move faster, as this will inevitably increase the cost of living and perhaps muffle economic growth. For this reason, carbon neutrality is fundamentally a global problem that does not resonate with or respond to daily needs felt at the local level.

Accordingly, transition and adaptation programs should be developed to respond to the needs of evolution towards carbon neutral solutions while responding to development needs. In the absence of a broad political consensus to curb emissions, the political system is likely to choose fragmented, imperfect approaches, and probably more costly solutions that may well aim below the targets that have been set, requiring more interventions in the future.

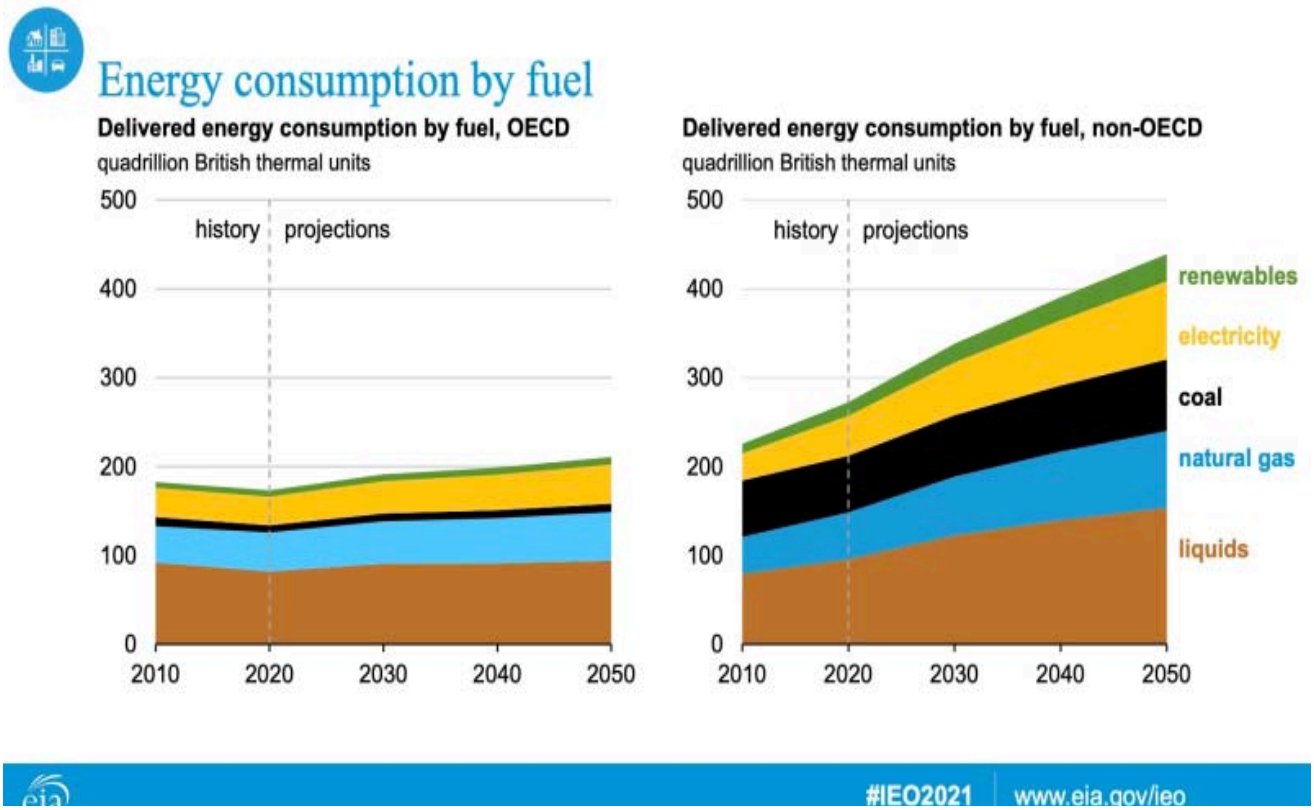
II. Expanding Renewables in Emerging Economies

Generate enabling conditions, capacity, not dependency

Most of the expanding energy demand (and CO_2 emissions) will be generated by economic growth in emerging economies (especially in Asia).

Ultimately, energy demand will be generated by economic and population growth. This will take place mainly in countries in their early stages of development, which tend to be energy-and hydrocarbons-intensive, basically to replace human and animal toil for small scale equipment driven by internal combustion engines, such as small-scale pumps, motorbikes and the like[vi]. Accordingly, attention will have to shift beyond OECD, which will constitute the largest share, both in relative and absolute energy growth.

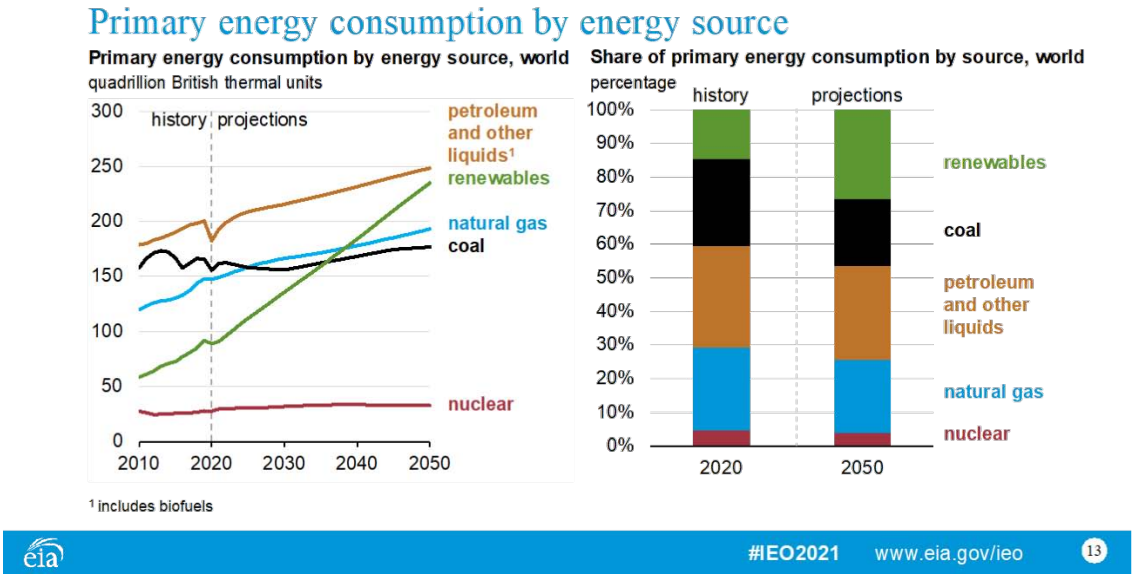
Not surprisingly, a scan be seen in the graph below, non-OECD energy consumption will constitute the largest share, in both relative and absolute growth rates over the next decades:



Accordingly, it is in non-OECD countries where attention needs to be focused -- as it is there where human, technical, organizational resources are also the weakest, and where the greatest support and adjustment will be required to achieve and effective transition.

In all, as things stand, aggregate energy consumption may change through rapid increase in renewables. However, short of a major technological breakthrough, the aggregate energy matrix will still have a significant share of traditional sources, such as petroleum and other liquids, and natural gas over the next decades.

These could provide the necessary base loads and associated reserve capacity, and a declining share of coal, as can be seen below -- which suggests that is rather unlikely that it will be possible to have a fully decarbonized economy by 2050, or the interim targets agreed 2030:



III. Decarbonization for Harder-to-Abate Sectors

If you don't like change, you will like obsolescence a lot less

At the same time, we do not have the technical solutions to meet about half of the CO2 emission goals set for mid-century, particularly to supply the energy requirements of the harder-to-abate sectors, with long replacement cycles. They need power with reserve requirements that renewable cannot provide because of their eliance on intermittent solar or wind conditions.

Manufacturing, aviation, heavy-duty transportation, mining and heavy industries are the scaffoldings for worldwide development, which are more difficult to electrify. Investments will have to be up scaled and innovation will be an absolute necessity to develop technologies for such activities through efficient and lower emitting hydrocarbons, hydrogen, carbon capture and offsets.

While such industries tend to concentrate in developed countries, extractive industries in general, and mining in particular, constitute the backbone of a large part of emerging economies. It is this sector that can generate the bulk of foreign exchange, fiscal revenues and surpluses to finance investments for economic development. Moreover, mining (particularly copper), while being both energy and carbon emitting intensive, is as well a key input for renewable power generation. Accordingly, this sector could position countries becoming an integral part of the emerging clean-tech economy and a source of growth in years to come.

Mining is both one of the most energy-intensive industry and a major source of raw materials for other industries, including renewable energy technologies. Both factors need to be reconciled to assure a viable long-term future in the mining sector.

The total global energy use by the mining industry comprises about 19% of global coal and coal products and 5% of global gas and 2% of global oil supplied. Total energy demand for mining is anticipated to grow over the near- to mid- term. A low-carbon future will be significantly more mineral intensive than a business-as-usual scenario. Global demand for "strategic minerals" such as lithium, graphite and nickel will skyrocket by 965%, 383% and 108% respectively by 2050.

Copper will also be needed for emerging technologies. While the growing demand for minerals and metals offers an opportunity for mineral-rich developing countries, it also represents a challenge: without climate-smart mining practices, the negative impacts from mining activities will increase, affecting vulnerable communities and environment.

Specifically, the mining industry is responsible for 4-7% of global greenhouse gas emissions – 1% caused directly by mining operations or indirectly through, for example, electricity consumption used to power mines; the remaining 3-6% coming from fugitive methane emissions. Emissions caused by all other indirect usage of the minerals extracted (for example coal used in coal-fueled power stations) are in turn responsible for up to 28% of global greenhouse gas emissions.

At the same time, the mining industry is bound to face increased demand for raw materials, as low-income economies shift to middle-income status, and increasing attention (and requirements) from high- and medium-income countries of emission standards in

trade arrangements throughout the value chain, and ensuing increased pressure on the mining industry to reduce emission from their operations.

These tradeoffs will not be easy to manage, because mining operations must remain sensitive to both energy efficiency and security to remain competitive and viable. Continuing lowering costs of wind and solar PV technologies have enabled some inroads of renewable energy in the mining industry. Greater advances and cost reductions in storage facilities will be still necessary to provide a sustainable base load to provide energy security needed by mining companies.

Accordingly, sustainable and responsible strategies and practices across the mineral value chain may have to be instituted to assist governments to build a robust policy, regulatory and legal framework that promotes climate-smart mining and creates an enabling environment for private capital to do its part at the mining industry level.[vii]

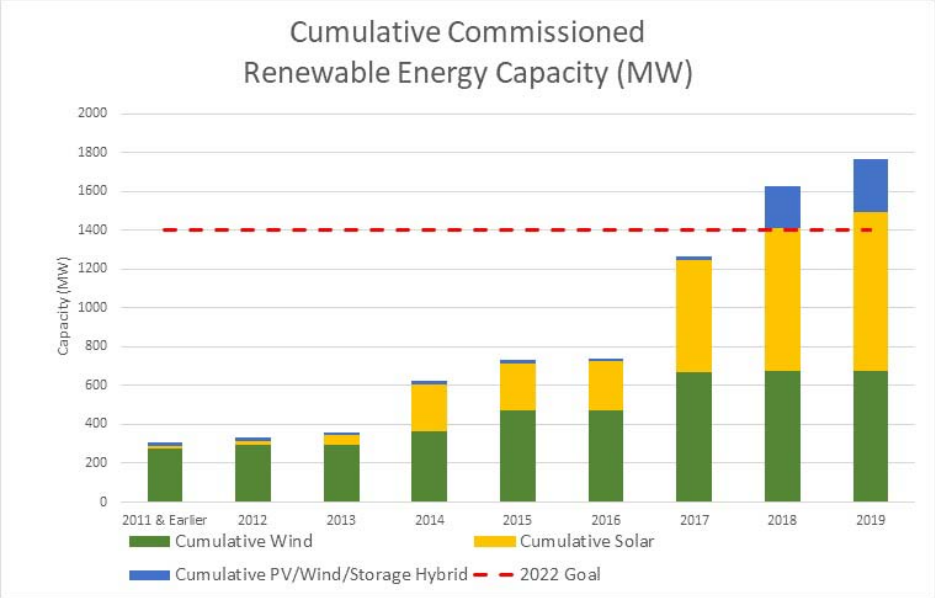
Mining companies have not ignored the need to become more environmentally responsible. Improvements in exploration and drilling equipment used to locate and extract minerals have created an unprecedented level of precision, reducing the amount of unnecessary excavation.

Elsewhere on site, the drive to reduce carbon emissions has impacted the modernization of mine vehicle fleets through hydrogen power. "Dual fuel" systems to power existing combustion engines have been introduced and new truck prototype are set to operate this year aimed at cutting carbon emissions by 2,260 tons per year.

Although not intended as a climate-smart investment per se, but as a strictly economic proposition, the El Teniente mine in central Chile (the largest copper production facility, with some 4,500 km underground corridors) is using gravity as a central source of energy by availing themselves of the major gradient existing between extraction at 2,500 to 3,000+ mts above sea level, and processing all the way through shipping at sea level in a rather narrow space.

Additional sources of low-carbon energy to generate further environment-friendly solutions still need to be developed. A low-carbon transition where mining is climate-smart and value chains are sustainable and green will enable emerging economies play a leading role in this transition.

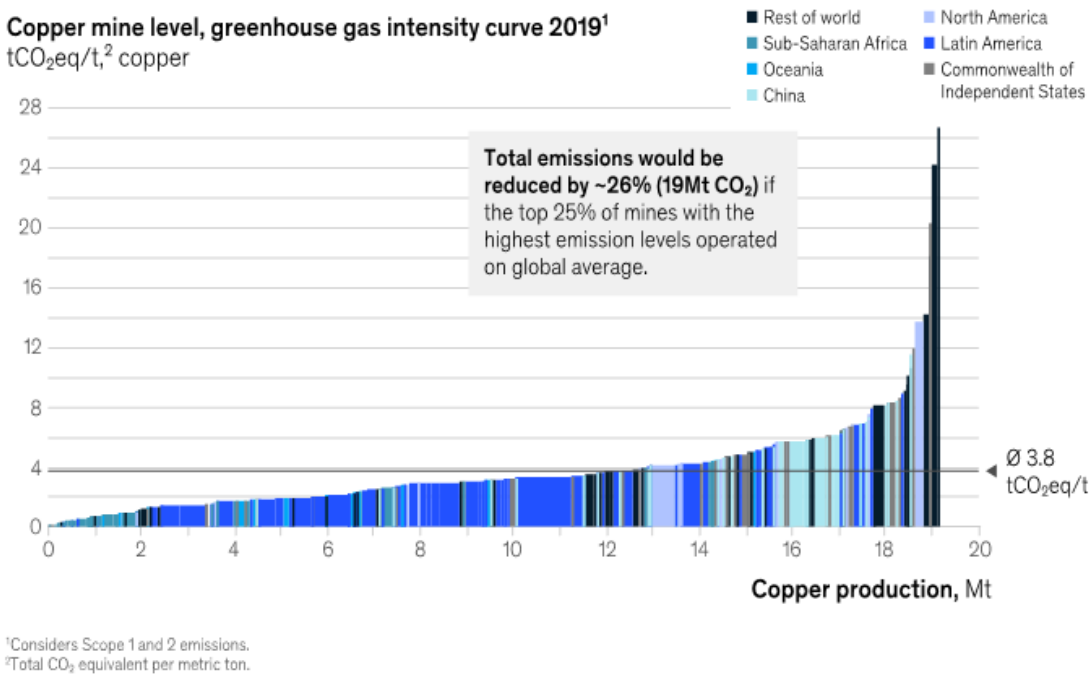
The mining sector is already availing itself of more recent opportunities for renewable use in mining operations, outpacing growth compared in many other sectors, though admittedly from a low base, with cumulative commissioned capacity surpassing 1.7 GW:



In years past, some mining companies have explored on a technology-driven "push"— advancing low carbon technologies and process design — to drive adoption of renewables and alternative energy sources.

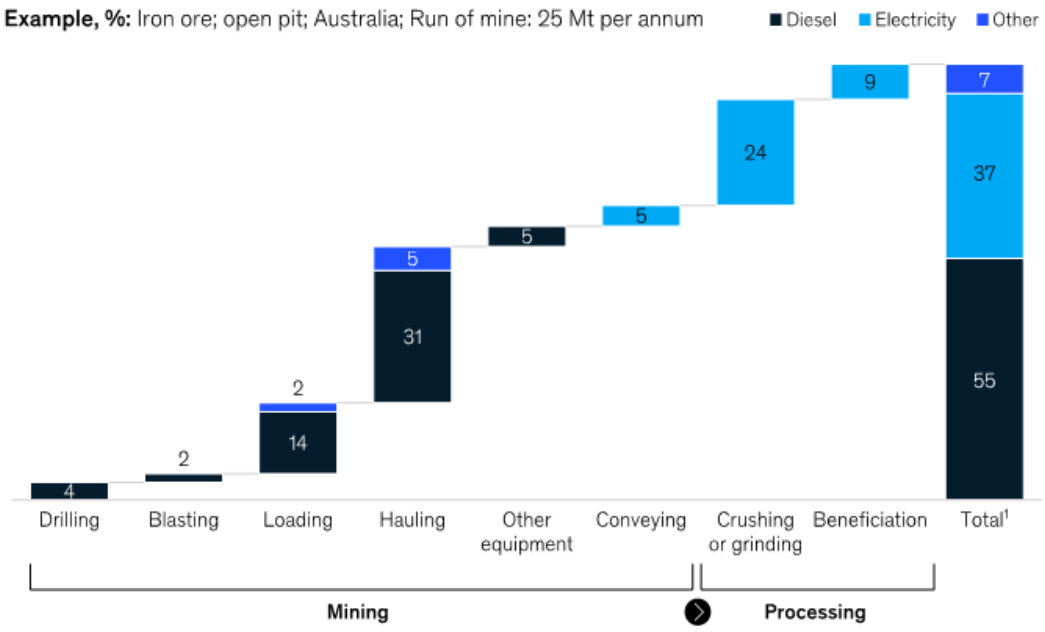
But there remains a long road ahead to overcome genuine concerns to move beyond well-established comfort zones in the sector. Emissions within mining can be broken down into three broad types: Scope 1 (emissions from diesel), Scope 2 (emissions from electricity generation), and Scope 3 (emissions from the supply chain and transport). Today 40 to 50 percent of CO_2 emissions come from diesel used in mobile equipment, with another 30 to 35 percent from nonrenewable electricity.

However, the emissions intensity varies widely across mines: for example, within copper, we see a twentyfold spread among the emissions intensity of mines, as can be seen below:



To understand this variation, McKinsey & Co., has created a comprehensive mine-decarbonization model. This breaks down mining emissions that assesses more than 20 decarbonization options illustrated below, to show what the world's net zero-carbon mine could look like:

Addressing emissions from multiple sources is key to the decarbonization of mining.



The transition from fossil fuels to low-carbon energy sources will depend on critical minerals. Their consumption could increase six fold by 2050, according to one scenario [viii]by the International Energy Agency. In the emerging world, trade [ix] in energy-related resources will consist largely of critical minerals rather than oil and natural gas. By value, this market could top $400 billion, exceeding the value of all the coal extracted in 2020.

In all, two applications could drive three-fourths of the demand for critical minerals in 2050: electricity networks and batteries. Half of projected demand by

then is for copper and a quarter is split between nickel and graphite. Then come lithium, manganese, and cobalt. In terms of value, copper accounts for a third of total in 2050, lithium and nickel each account for almost a quarter each, graphite 10 percent, and cobalt 7 percent. Copper, lithium, and nickel will account for over 80 percent [x] of the market value in 2050. The production of each mineral is concentrated, but major producers differ by commodity.

Indications are that many investors are adopting the "Toronto Principle", inducing them to selling all their fossil fuel investments. The Financial Times reported in September 2019 that the number of institutional investors pledged to completely remove fossil fuels from their portfolios by 2030 had jumped from 180 in 2014 to over 1,100, representing around US$11tn in assets. Other signs that the mining and other such industries will face an increasingly hostile investment environment include the European Central Bank's consultation, published on 20 May 2020, to guide banks to price their loan products in correlation to the environmental risks of enterprises in question.

IV. The Technological Change Route to Close the Long-Term Gaps

If it looks familiar, you've seen it in your dreams

Important as renewables may be, they are *perforce* climate-dependent given the intermittent nature of solar and wind energy sources, and ultimately location-specific. Accordingly, they are at times hindering construction of renewable power plants near heavy industry and mining sites, which oftentimes makes remote and long replacement cycle operations dependent on fossil fuels such as diesel, heavy oil fuels, and coal, for on-site generation.

Given such limitations, continuing efforts will be needed to further reduce their costs, so that they become competitive at similar load factor and at grid levels. It is, nonetheless, an absolute necessity to research and develop new sources for cleaner energy, to close the gap to achieve the agreed mid-century goals.

The Annex to this article contains a description of half a dozen options at research and development stage, and are at various experimental phases, several of them in confined environments or laboratories. There are other geo-engineering variants being considered with other compounds to scatter sunlight, aimed at reducing more directly global warming.

In all, as things stand, aggregate energy consumption may change through rapid increase in renewables. Short of a major technological breakthrough, the aggregate energy matrix will still have a significant share of traditional sources, such as petroleum and other liquids and natural gas, which is lower CO_2 emitting than other traditional sources.

V. The Policy Route towards Aligning Interests

Dead fish go with the flow

Given the urge for effective action, cooperation will be essential. However, the approach cannot succeed if it seeks uniformity, but honors diversity, to free countries try out and experiment different approaches and technologies, until effective ones are found that can demonstrably address the energy/environment conundrum.

All too often, well intentioned policies lead to unintended consequences. The proliferation of earmarked funds for renewable energy to accelerate the process has produced a multitude, oftentimes conflicting signals and distortions that required counter-measures to compensate for such distortions. Similarly, "picking winners" has led to choices that oftentimes societies have bulked to accept.

Instead, anchoring policies in non-distorting incentive (such as *carbon pricing*) mechanisms will be required to enhance investment environment and provide much-needed energy security in a period of transition and experimentation.

This is especially important when renewable energies, by definition, are dependent on (and vulnerable to) climatic factors, and their costs are still relatively high at current levels of development, particularly when adjusted by load factors.

To "level the playing field" between traditional and renewable energy sources, the cost of emissions will have to be recognized, subsidies to traditional sources discontinued, and the multiplicity of earmarked funds that distort and resource allocation will have to be avoided.

Whatever the formula to establish prices and/or methods of CO_2 *tax collections,* until a free and a functioning carbon market is established, a more forceful and rapid change of the energy matrix can take place. [xi]

At the moment, we are still far from such an objective, since in only G20 countries, application of carbon prices reached 48 percent of all polluting sector, and the average price barely reached $ 20 per emitted ton - vs. $ 70 that is estimated to prevent the temperature from rising beyond 1.5° C.

As the low-carbon transition gathers pace, voluntary carbon markets (VCMs) are growing around the world alongside and, in some places, in lieu of compliance oversight arrangements, at times in the absence of more formalized government-led schemes. While nascent, the VCMs, where companies purchase credits to offset their emissions, surpassed last year $1 billion, covering almost 640 companies from the S&P 500 and high-emitting sectors, and some 27 percent of U.S. companies now have set net zero targets.

Together with other policies, well-designed VCMs can help reduce costs for emerging climate technologies. This is bound to enhance their chances of adoption at scale, achieve more significant decarbonization and market efficiency across regions.

In some cases, such as the European Union, carbon border adjustment (or *taxation*) mechanisms are starting to take shape as a form of carbon pricing of imported goods and the path to advancing climate action globally in the coming years.

With emerging guardrails and transparency, carbon credits generate a vital source of finance for projects that contribute to climate mitigation, resilience, and sustainable development goals, which can avoid "greenwashing" of unsubstantiated claims of emission reductions.

Admittedly, an unresolved challenge is the quality of carbon offsets that underpin this trade. With more companies adopting net-zero emissions targets, the market for fossil fuel carbon offsets (including oil [xii]as well as gas) has developed quickly. But there is great skepticism[xiii] over the consistency and quality [xiv]of carbon offsets.

Problems include the often murky distinction[xv] between carbon reductions or avoidance versus actual carbon removal, potential conflicts of interest among third-party verification agencies, and lack of governance [xvi] of carbon markets to ensure consistency.

VI. Reflecting on the Future

Sell on the what, buy on the how

As those who have been in charge of implementing major reforms well know, the distance between design and reality is long. The major fault lines that need to be pierced are centered between defining the *what* and addressing the *how*.

At the bottom of it all, the tectonic shifts taking place around the world have tended to leave governments generally misplaced in dealing with dynamic changes. In fact, it is difficult not to see the glaring gap between goals and achievements in the energy and environment debate at governmental levels, and its farcical disconnects from the more here-and-now societal concerns on energy security, affordability, and sustainability at household levels.

Nowhere has this become more evident than at the gas pump – where, for instance, 40% of European gas was supplied by Russia. It follows that since this energy flow has stopped, induced by both, policy decisions to curb hydrocarbons production delinked from geopolitical power shifts, triggering price surges to record levels in much of the world.

No technical (solar, wind or other) fixes, or push for certain aggregate goals is going to be effective, unless it provides an adequate response to consumers' real needs, and enterprises have the proper framework and incentives to operate and invest.

Ultimately, the transition to zero emissions by mid-century must be affordable, reliable, and ever cleaner. That in itself will not be easy to achieve, unless an effective and strategic way is developed to: (i)deal with unattended transitional arrangements, particularly the phase out fossil fuels, including coal, in an economic manner, and the associated repurposing and reconversions of existing power generating facilities and infrastructures to change the energy matrix; and (ii) shape institutional and other actions to ensure that they properly respond to stakeholders and citizenry to assure ultimate viability of reforms.

As to the former, special attention will be required for appropriate technical and financial assistance to support the energy security needs of coal-dependent countries like India and South Africa – the two most coal-dependent economies out of the G20 countries, with 71 and 86% of their electricity, respectively coming from coal. Discontinuing coal production will not be without its serious social and economic repercussions, and thus need more nuanced approaches for the transition.

The same can be said about countries with significant traditional power generation facilities and the manner to approach any transition that is bound to claim significant human and financial resources to ensure an evolution that will be within the absorptive capacity of the countries concerned.

Pushing harder, having good intentions, throwing money or new promises of financing to the problem for increasingly ambitious and distant goals, as has been done to date in past COP meetings, or discouraging certain technologies (on the supply side) through laborious clearance processes for individual projects will not generate progress. A more promising avenue is to act through the demand side, letting consumers and suppliers allocate resources and reach agreements through proper pricing and taxation arrangements.

Beyond that, no political, social or moral achievement is without formidable obstacles. There are vested interests to be confronted, attitudes to be changed, resistances to be overcome. The problems are immediate, the ultimate goal frustratingly far away.

The challenge to address both of them requires leadership by influence -- not about authority, but capacity to "read" citizenry, aligning incentives capable of mobilizing a myriad of strands and people, without the need of complicated coordination or farcical clearances at individual projects levels. More than anything, this requires integration and coherence of action, capable to learn from experience and be continually adaptive.

Each country has its institutional capabilities and policy framework, particularly in new and evolving

forms of energy generation – no two countries are alike. A viable (and yet unproven) international framework will have to learn and accommodate each country according to their individual character and capability.

History often foretells that in times of necessity, our most precious allusions get dispelled. And this is never so much the case, as in times of crises and unattended demands. Today, with continuing concerns on pandemic, energy transition, technology revolution, we are beginning to wake up to a global paradigm shift. Generational security doctrines and economic orthodoxies that have been rooted in a post-WWII global order are faltering in the face of shifting economic and political weight, including a Sino-Russian alliance flexing its muscles.

The challenge is thus to generate sustainable development responding to changing societal demands— never forgetting that it is at the kitchen table and the tightening purse strings that are the real drivers shaping ongoing worries. A people-focused approach that responds to concerns on energy security, affordability, and sustainability may ultimately contribute to lifting people out of poverty.

Annex

Technologic Development for New Sources for Energy Supply of Hard-to-Abate Sectors and General Economic Development

Various new sources of energy are being studied, in early stages of research and development.

These include, among others the following:

- *Developing zero-carbon fuels.* As 80% of global final energy demand is currently served by high-emitting fuels, zero-carbon substitutes will be key to full decarbonization, as fuels could still serve one quarter of final energy demand by mid-century. Marine shipping, heavy-duty trucking, high-temperature industrial process heating, iron making, long-duration energy storage, and aviation are particularly difficult to electrify and will need cost-effective zero-carbon fuels.
- *Enhancing reserve capacity of new technologies* with batteries or other energy storage facilities that are for the time being rather costly, and could in time improve in cost-competitive long-term storage systems (advanced batteries, fuel cells, thermal storage, and clean hydrogen systems requiring coordination among many actors for producing, transporting, and having the equipment to use it.); scalable low-carbon firm electricity generating technologies (including possible advanced nuclear).
- *Upscaling renewable generating facilities, such as run-of-river plants*, which at present range from 8 to 50 MW capacity to plants over 500MW by connecting various water sources affluents, as currently is being constructed and tested in Chile and Australia.
- *Developing carbon-capture and storage capacity* to remove CO_2 "sinks" and facilitate carbon neutrality through removals in the event that new technologies will not be able to produce carbon-free conditions. For the time being, existing technologies are prohibitively expensive, and require considerable energy if capture is to be done from the air directly.
- *Enhancing performance of solar (and other renewable) equipment* with nanotechnologies or improvements aimed at reducing costs of solar cells and the carbon footprints of upstream production, thereby bringing photovoltaic applications to competitive levels with traditional generating technologies at grid levels.
- *Developing technologies aimed at lowering temperatures* and improving rain conditions by sowing clouds with silver iodide to induce rain; adding iron to the ocean to increase CO2-consuming phytoplankton; or reducing solar radiation with sulfates.

[i] Keywan Riahi, Arnulf Grubler, and Nebojsa Nakicenovic, "Scenarios of Long-Term, Socio-economic and Environmental Development Under Climate Stabilization, "Technological Forecasting and Social Change 74, no.7; 887-935, https://dol.org/10.1016/.j.techfore.20006.05.026

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[xiv] https://www.volts.wtf/p/carbon-offsets-arent-working-and?s=r

[xv] The Oxford Principles for Net Zero Aligned Carbon Offsetting (Sep 2020): https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf

[xvi] Bloomberg Green Finance: https://www.bloomberg.com/news/features/2021-06-02/carbon-offsets-new-100-billion-market-faces-disputes-over-trading-rules?sref=B2BBHw9t

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ASSOCIATE OF MANAGEMENT AND BUSINESS RESEARCH COUNCIL is the membership of Global Journals awarded to individuals that the Open Association of Research Society judges to have made a 'substantial contribution to the improvement of computer science, technology, and electronics engineering.

The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Associate membership can later be promoted to Fellow Membership. Associates are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Associate Members.

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Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

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Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

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2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
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6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

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Plagiarism is not acceptable in Global Journals submissions at all.

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- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
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- Any other original work

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2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

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Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Management Research Paper

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of management and business then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.
Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

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- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.

- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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