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Influence of Demographical Experiences in Importance of Technological and Managerial Factors on Productivity Enhancement of Dewatering Plants

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Abstract: ***The demand for mineral products has increased in the international level along with economic development. As a result, the production and accumulation of mineral resources have gone up. However, it has caused many problems with respect to economy and the environment. Due to this, in the mining process, they must be reasonably treated to prevent from entering the water cycle through rivers. For further recovery as an industrial by-product, there is a need for installation of Dewatering Plant to address the Environmental sustainability and optimisation of Plant Productivity. Productivity is also influenced by various technological and managerial factors. This paper describes the Influence of demographical experiences and considered managerial and technological factors in optimization of Productivity of Dewatering Plants. Here considering the case of key Dewatering Plants in India, perceptions of experienced personnel associated with Dewatering Plants have been analysed to study the influence of both factors. The analysis was done based on different demographical experiences of respondents. This paper discusses findings of significance levels of both technological as well management factors based on demographical experiences and suggests how this could be strategically used in any organizations particularly in dewatering plants.***
Keywords: Dewatering, Technological factors, Managerial factors, Productivity

I. INTRODUCTION

In the competitive world, every organization intends be profitable and successful in the business as much as possible, as the current environment is rapidly changing and challenging. (Mudor and Tookon (2011). Enhancement of Productivity of Dewatering Plant and its success depends both on technical and as well managerial factors. For sustainability, managerial and as well technological issue needs to be addressed religiously as these initiatives drive effective Implementation of Processes, which yields in terms of Plant Productivity. In mining and ore beneficiation industries, disposal of ore waste tailings poses a major environmental challenge to the whole world (Malikova, Thomas, 2015). In order to avoid, they were first discharged to the trailing pond and allowed to settle there. The overflow dirty water flows through other multiple Ponds for further settlement and finally at end water having some suspended particles pumped back to Plant for reuse. These multiple tailings Pond, covers huge space and evaporation water loss and other unsafe hazardous handling problems (Osta, Haran, 2018). Thus, Press-filter technology has been developed as a latest technology in the field of dewatering as the most viable alternatives for mechanical tailings dewatering yielding low moisture content tailing cake (Bickert, 2012). Significance of this new technological Dewatering Plant as it occupies a very low space, no evaporation loss of water i.e. full recovery of filtrate water after dewatering for reuse, no such evacuation of ponds eliminating unsafe and hazardous activities etc. But, in today's competitive world for any plant the challenges are of Plant Productivity. Thus, this paper discusses on Influence of demographical experiences with respect to Technological and Management factors on Plant Productivity of Dewatering Plants in India. Influence of these factors has been analyzed based on demographical experiences of respondents, associated with different dewatering plants. The study based on identification of Key Techno-Managerial factors influencing Plant Productivity. Questionnaire was designed based on Technical and managerial factors based on various demographical parameters and responses were collected from different Tailing Dewatering Plants India. In this study, respondents were a group of Senior Management Professionals, Managers, Engineers, all other stakeholders' viz. Vendor Partners, suppliers and Consultants participated, deliberated and shared their views.

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II. LITERATURE REVIEW

Manufacturing Plants adopts lean manufacturing process and Total Productive Maintenance (TPM) methodology. To enhance their productivity, Overall Equipment Effectiveness (OEE) is also used as a key performance indicator (KPI). (Osta, 2016). In mineral beneficiation process industry dewatering is a necessity since it improves easy recovery of mineral tailings and reduces transportation costs. In this process, it gets a material that is easier to handle in a wide range of processes. The dewatering process requires pressure filtration as in the process no effluent discharge being created. Thus, it is reckoned as environmentally sustainable technology worldwide (Svarovsky, 1985).

Sustainability has played a vital role in Environmental management and concern in their study in the handloom products in India (Mishra & Barik, 2025). Brakel et al.1984 & Wakeman, 1984 studied that settled Slurry from thickener underflow is transferred to buffer tank and again it is dewatered to produce Cake of tailings material through pressure filtration. The Pressure filtration is the process of separating solids and liquids by forcing mineral slurries through a porous medium which is generally a filter Plates having Filter cloths and it retains the solids, i.e., filter cake. The major driving force is the pressure, exerted by the slurry and pumped into the filter chamber. As the solids deposit on the filter medium deposition shifts to the cake itself. This medium acts only as a support and the liquid separated out due to squeezing. When the air is blowed through the cake, the additional liquid squeezed out of the cake. (Cox, Traczyk, 2002).

Generally, pressure filtration device is the plate-and-frame filter press. The filter press dewaters in a batch process by compressing and squeezing the input slurries between sets of Filter plates. The dewatered tailings cake is discharged by self-weight when the plates are opened.

The plates are covered with a polymer cloth at its both ends, which acts as the filter medium (Wills et al.2006). Press-filter consists of multiple chamber filter plates mounted vertically and suspended from an overhead beam. Both faces of the filter plate have a drainage surface like ribs or grooves to allow filtrate to drain behind the cloth to the drainage ports. Operating pressures for a Press-filter ranges up to 6-8 atmospheres; however, Press-filters up to 20 atmospheres are also available (Svarovsky, 1990). This machine can dewater ore tailings to as low as 20% moisture (Patwardhan et al. 2006).

A number of papers and research studies have discussed about the experiences of Technological and Management factors and their influence in Plant Productivity enhancement. The literature indicated that most of the oorganizations irrespective of size and market strive to retain the best employees. They also acknowledge their important role and influence on organizational effectiveness. In order to retain employees and to overcome challenges, organizations should create a strong and positive relationship with its employees. As a process, they direct their employees towards task fulfilment and ensure that they have job satisfaction (Fisher, 2012). Organizations develop innovative strategies to prepare in a highly competitive markets to achieve their goals, objectives and to increase their performance.

However, a few organizations consider the human capital as being their main asset. This may lead them to either success or failure. If not managed properly, can lead to high staff turnover (Fisher, 2012). In a business environment, improvement of productivity is essential for long-run success.

Mangers in the business increases the efficiency by utilising managers can taking cost reduction initiative, save scarce resources, and increased profits. In turn, improved profits allow an organization to provide better remuneration, perks and safe working conditions. Finally, the result can be a higher quality of skilled work employees, who are more likely to be motivated towards continuous improvement in productivity. (Wentzel and Wigfield, 2009).

A. Research Gap

Human resources are the key element for productivity enhancement. At the same time, demographic parameters also influence. The study has undertaken deep literature review to get the insight into it. However, it reveals two main research gaps. In first case, few organizations give importance to their human capital which needs to be studied in detail according to the plant. The second aspects of research gap are the limited study on their demographic parameters.

B. Objectives

- To know the influence of important demographic parameters on the enhancement of productivity
- To provide suitable suggestions to improve the productivity in case of Dewatering Plans

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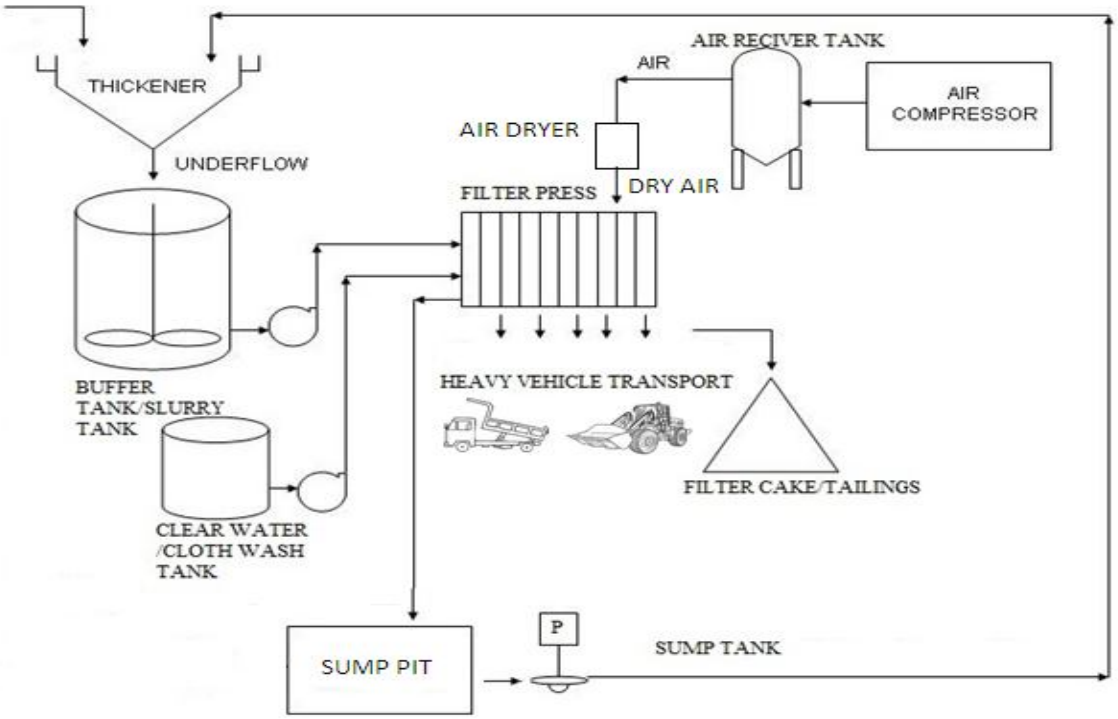
Fig 2.1 Process flow - line Diagram



III. RESEARCH METHODOLOGY:

Key factors have been identified from Literature reviews, focus group and interactions with senior management, Plant officers and Supervisors. From this, technological and Managerial factors were identified. Technological factors include Standard operating Practices (SOP), Safety initiatives, Technological learning's or Innovation Management, Plant layout or Orientation and Materials Management. Leadership, Management of change, Teamwork, Motivation, Training & skill Development covered under managerial factors.

Based on these factors, a structured questionnaire was developed and Pilot testing was done. Primary data has been collected by mailing the questionnaire to target respondents at Sukhinda Dewatering Plant and consultants with a request to return it after completely answering the same. Data was also collected through personal interview during meeting with the Employees at Jamadoba and Ghato Dewatering Plant, and through telephonic interview of Consultants and Technology suppliers.

1) Data Collection Instrument: Questionnaire was designed based on Technical and managerial factors based on various demographical parameters and responses were collected from different Tailing Dewatering Plants India.

2) Sampling Unit: In this study, respondents were a group of Senior Management Professionals, Managers, Engineers, all other stakeholders' viz. Vendor Partners, suppliers and Consultants participated, deliberated and shared their views.

IV. DATA ANALYSIS

For the study, 205 samples were considered. The respondents were taken from Dewatering Plants, located in Ghato, Sukhinda & Jamadoba in India. The Table below shows the result.

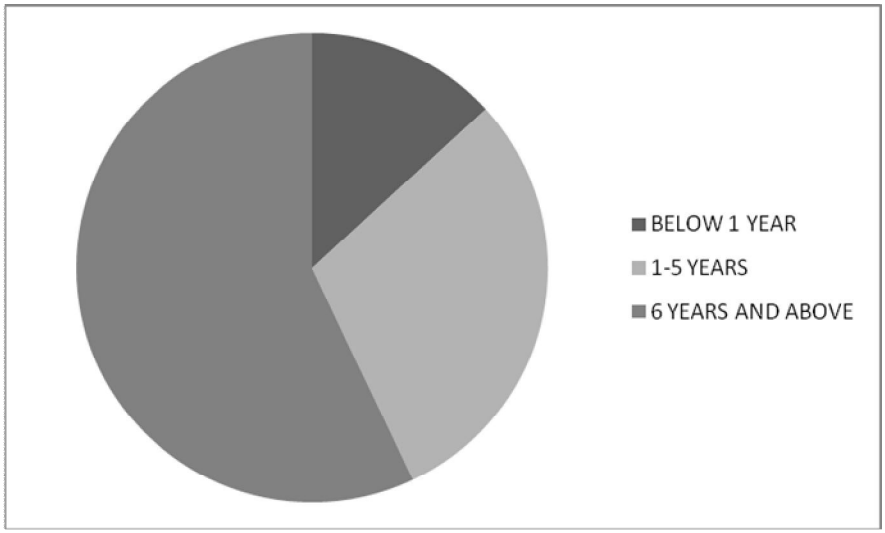
Table 4.1 Analysis of Managerial and Technological Factors based on overall respondents

Factor	Numbers of respondents	Percentage
Managerial Factors	90	43.9
Technological Factors	115	56.1
Total	205	100.0

90 respondents on managerial factors and 115 respondents on Technological factors have given their views.

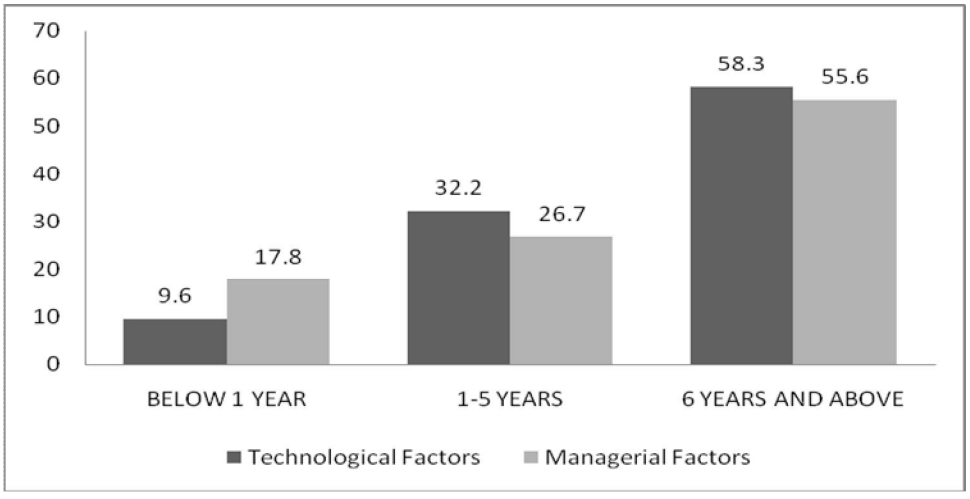
In order to get the accurate influence of experiences of Techno-Managerial factors for the enhancement of Plant Productivity, the respondents were categorized into three such as respondents with total working experience, respondents who have an experience in working with Dewatering plants and respondents having experience in working in the number of Dewatering plants.

Fig 4.2 Work experience of respondents (in years)



From the analysis, it is clear that 13.2% of the respondents have below 1 yr. of experience, 29.8% of the respondents have 1 to 5 years of experiences and 57.1% of the respondents have more than 6 years of experience. This indicates that majority of the respondents (57.1%) have larger experience of more than 6 years as compared to other respondents. This shows that more than 50% of the respondents have better experience and practical knowledge in handling Dewatering Plants.

Figure 4.3 Analysis of Technological and Management factors w.r.t. respondents working experiences



From the above figure 4.3, it is evident that respondents having low experience (below 1 Year), managerial factors is prominent and it increases with increase the number of experience and is highest in case of having experience of 6 years and above. The similar trend is also observed in case of Technological factors and it increases with increase in the number of experiences. However, it is observed that in case of experience 1-5 years and 6 years and above, technological factors although both the factors are significant as per the different experience levels of respondents but with low experience (below 1 year) - management factors are more significant and with the increase in experiences; technological factors marginally dominates the management factors and influences on Plant Productivity more significantly.

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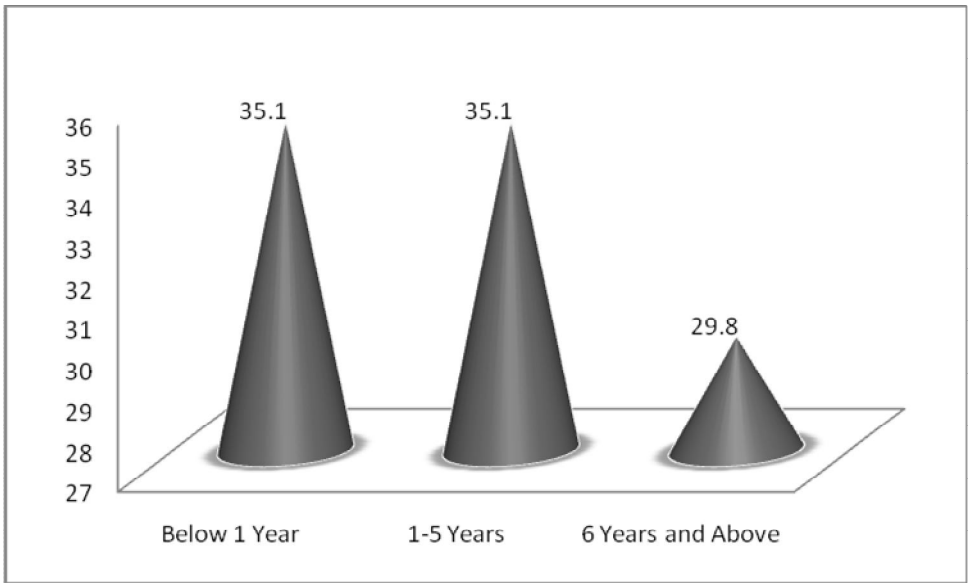
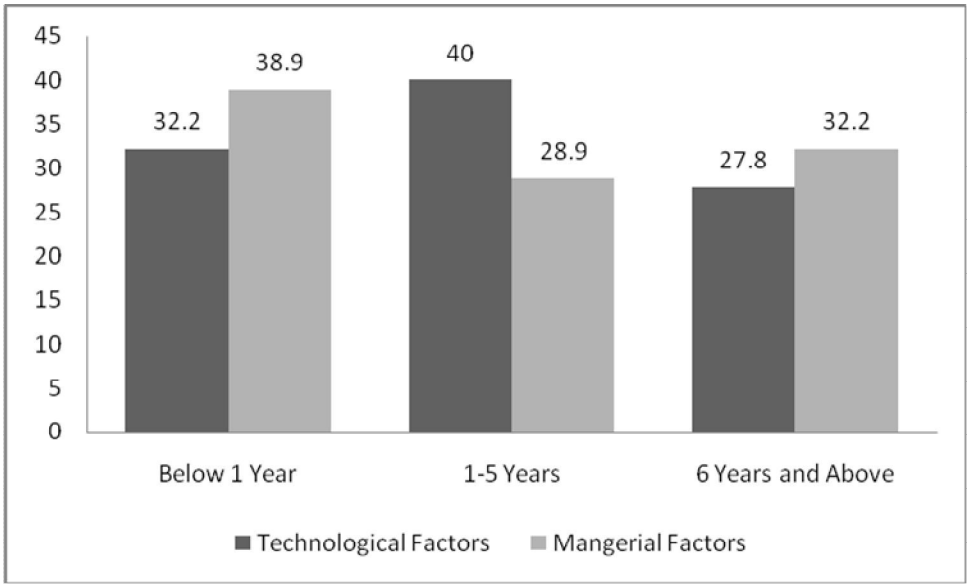
Figure 4.8 Respondents demography as per their experiences in working in Dewatering Plants



From the figure 4.8, it is evident that the respondents having core Dewatering Plants experiences also exists in a distributive way i.e. around 35.1% have experience of both below 1 year as well 1 to 5 years too. Moreover, around 29.8% respondents have more than 6 years and above experience of core Dewatering Plants. This signifies that the study had covered more practicality.

Figure 4.9 Significance level of Technological and Management factors as per the respondent's experience in working in Dewatering Plants.



From the figure 4.9, it is evident that although both the factors are significant as per the respondents core experiences in Dewatering Plants but at low level of experience i.e. (below 1 year), management factors are more significant and with the increase in experiences (1-5 years), technological factors chosen as more significant one and again at high experiences of 6 years and above; management factors influences on Plant Productivity more significantly than technological factors.

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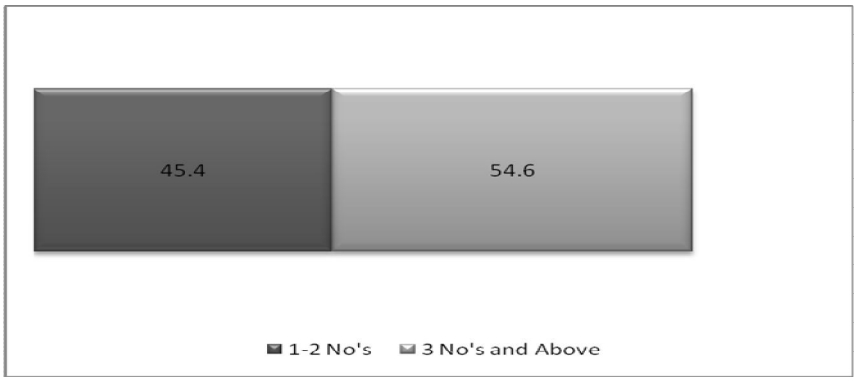
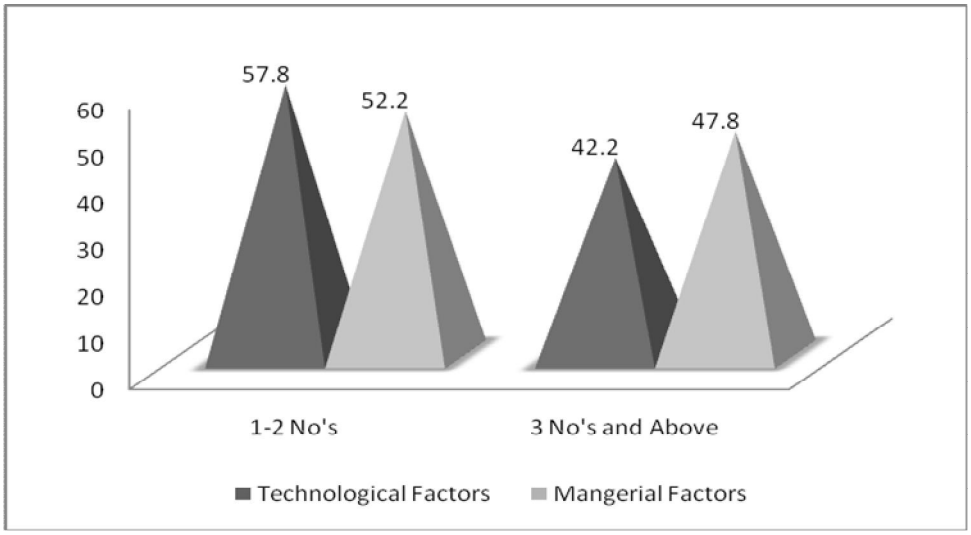
Figure 4.10 Respondents demography as per their experiences in no's of Dewatering Plants



From the figure 4.10, it is evident that the majority of respondents have very rich core Dewatering plants experiences, as almost 54.6% are associated with more than 3 no's of Dewatering Plant's and 45.4% are worked for 1-2 no's only. This further indicates that the responses are more practical as per study of dewatering plants are concerned.

Figure 4.11: Significance level of Technological and Management factors as per the respondent's experience in nos of Dewatering Plants



It is evident from the above figure that both the technological and managerial factors are responsible and significant with reference to the levels of association of the numbers of dewatering plants. association levels of respondents but with low association of 1-2 no's, technological factors are more significant and with the increase in no.'s of dewatering plants association (3 no's and above); management factors influence on Plant Productivity more significantly than technological factors.

V. DISCUSSIONS AND CONCLUSIONS

From this study based on different demographical experiences and analyzing the collected data, it is evident that Technological as well Management factors are significant and they influence the Productivity of Dewatering Plant. However, from this study, as an overall view Technological factor seems to be more significant. But on the other hand, respondents having low working experiences prefer Management factors as more significant.

Thus, at starting stage of working in Plant, one has a greater perception towards management factors, but with time, going deep into the technological interventions in the Plant, the inclination towards Technological factors is quite obvious. This also gets validated during mid period i.e. in and around 5 years of their working experiences. Further, after getting much exposure i.e. more than 6 years of working experiences, again preferences of significance level, shifts towards management factors.

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VI. RESEARCH IMPLICATION

The implication of these findings helps any industrial organization, specifically having dewatering businesses in making their human resource related strategy. Planning of Human resources is a critical activity in case of dewatering plans. This help in identifying the training need and balancing all the functional activities attributes. The findings of this research will be able to assist in the development of managerial policies in an effective way. This in fact will help in improving the organisation goals and administrative efficiency.

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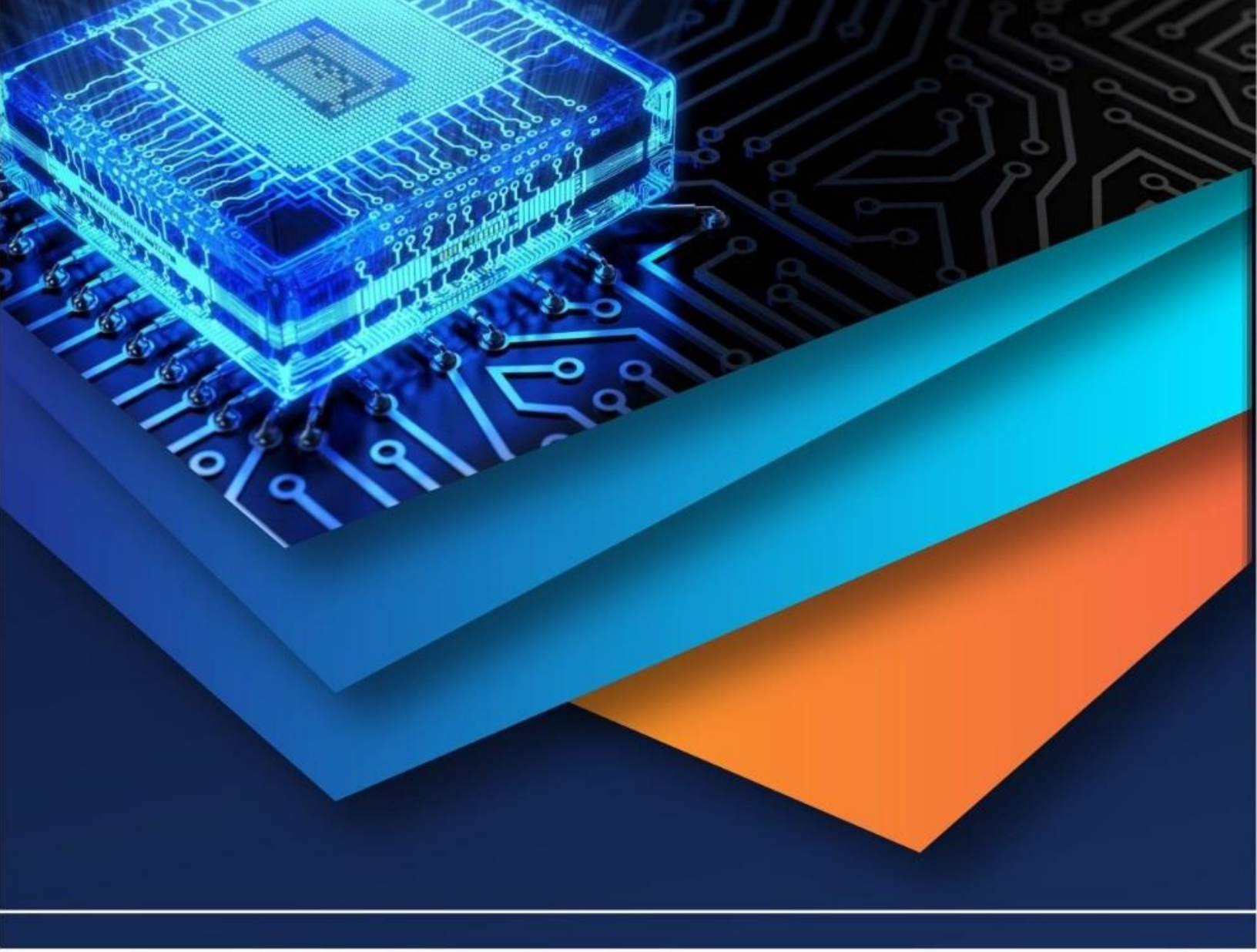

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