

CEO Characteristics, Enterprise Resource Planning, and Performance

Alex Johanes Simamora^{1*}, Siti Rokhaniyah², Atika³

^{1,2,3}Program Studi S1 Akuntansi/ Fakultas Ekonomi, Universitas Tidar, Indonesia

*email: alexjohanessimamora@untidar.ac.id

Abstract

This research is aimed to examine the moderating role of CEO characteristics on the effect of ERP implementation on performance. This research uses random effect regression. The research sample is 665 firms-years observations of manufacturing firms in Indonesian Stock Exchange listed from 2012 to 2018. The sample consists of 238 firm-years that implement ERP as main group sample and 427 firm-years that do not implement ERP as control group sample. Result shows that ERP implementation is effective to increase performance when firm led by female CEO, higher-educated CEO, longer-tenured CEO, and younger CEO. This research contributes to fill gap of previous findings about inconsistent result of ERP implementation on performance. This research has implication for firm, especially for ERP implementer firm to make policy about CEO selection by considering gender, age, education, and tenure, so the ERP can be implemented effectively.

Keywords:

CEO Characteristics; Enterprise Resource Planning; Performance

Abstrak

Penelitian ini bertujuan untuk menguji peran moderasi karakteristik CEO pada pengaruh implementasi ERP terhadap kinerja perusahaan. Penelitian ini menggunakan regresi *random effect*. Sampel penelitian terdiri dari 665 observasi dari perusahaan manufaktur yang terdaftar di Bursa Efek Indonesia tahun 2012 hingga 2018. Sampel penelitian terdiri dari 238 sampel yang mengimplementasikan ERP sebagai kelompok utama dan 427 sampel yang tidak menerapkan ERP sebagai kelompok kontrol. Hasil penelitian menunjukkan bahwa implementasi ERP ditemukan efektif dalam meningkatkan kinerja perusahaan ketika perusahaan dipimpin oleh CEO berjenis kelamin wanita, CEO dengan pendidikan tinggi, CEO dengan masa jabatan lebih lama, dan CEO yang lebih muda. Penelitian ini berkontribusi untuk mengisi kesenjangan temuan sebelumnya mengenai ketidakkonsistenan dampak implementasi ERP terhadap kinerja perusahaan. Penelitian ini memiliki implikasi untuk perusahaan, terutama untuk perusahaan yang mengimplementasikan ERP, untuk membuat kebijakan tentang pemilihan CEO dengan mempertimbangkan jenis kelamin, usia, pendidikan, dan masa jabatan sehingga ERP dapat diimplementasikan secara efektif.

Kata Kunci:

Tax Avoidance; Leverage; Profitabilitas; Corporate Governance; Nilai Perusahaan

INTRODUCTION

Uncertainty of business environment leads to awareness of firms for doing their operational business. Information technology implementation in Indonesia grows. BPS-Statistics Indonesia (2019) reports that information technology development index increase from 3.85 out of 10 (in 2015) to 5.07 out of 10 (in 2018). Information technology implementation is also used by business participants. Information technology helps firms to create their competitive advantage. Information technology helps business to store and process data into useful information. Information technology also helps to trade information without many barriers. Information technology is expected to enhances operational business as well as firm performance (Ahmad & Arshad, 2014).

Enterprise Resource Planning (hereafter ERP) is one of information technology system could help firms to enhance operational activities. ERP is able to provide high quality information in order to make high quality business decision. ERP is an integrated system based on end-to-end business process in the organization (Kristianti & Achjari, 2017). ERP system could consists of financial modules, human resources and payroll modules, order to cash modules, manufacture purchase to pay modules, project management modules, customer relationship management modules, and system tools modules (Romney & Steinbart, 2018).

ERP implementation can increase financial performance as well. ERP system can fulfill the information needs. ERP system allows firms to collect and analyze business information they need in all department and operational aspects at once. Majority of ERP implementation is motivated by cost reduction, efficiency, product cycle time reduction, customer needs fulfillment, face the market uncertainty, and take a step into e-commerce. ERP system could be a way for firms to create their competitive advantage (Nicolaou & Bajor, 2004).

Some previous results examine the effect of ERP implementation on performance. Firms that announce ERP implementation increases stock price performance (Hayes et al., 2001). Hunton et al. (2003) also find that ERP adopter firms have higher return on assets. Wier et al. (2007) find that ERP system implementation increases both accounting and market performance.

On the other hand there are previous results that ERP implementation failed to improve performance. Kurniawati et al. (2015) find that ERP implementation has no effect on performance Poston & Grabski (2001) do not find any net income improvement for ERP-adopting firm after 3 years. Achjari & Wahyuningtyas (2014) also find stock market does not see information technology as good signal for business. Sutarti et al. (2019) find that firms with information

technology bear high investment cost that can reduce profitability.

Inconsistent findings about ERP and technology on performance could be caused by the complexity of technology implementation. ERP is a complex system that has to be implemented carefully. It is not only can be achieved by financial ability to make such high cost investment, but also commitment and ability to perform effective ERP system.

Kachelmeier (2010) explain that instead on firm, people who can make decision. Since ERP is a quite high cost and strategic investment, Chief Executive officer (hereafter CEO) has main responsible to make decision and implement ERP effectively. CEO has main role to make decision and execute succeed business strategy, include in ERP system implementation decision. Effective ERP implementation to improve performance depends on CEO characteristics. Hambrick & Mason (1984) explain that managers' cognitive and value are the main determinant factors of strategy selection, include in ERP implementation strategy. Different cognitive and value come from different manager's characteristics.

This research objective is to examine the moderating effect of CEO characteristics on the effect of ERP implementation on firm performance. Since CEO is also involved in ERP system implementation decision making, CEO characteristics can also determine ERP implementation effectiveness. This

research contribution is to fill previous findings gap about technology implementation such ERP (e.g. (Achjari & Wahyuningtyas, 2014; Hunton et al., 2003; Kurniawati et al., 2015; Poston & Grabski, 2001; Sutarti et al., 2019; Wier et al., 2007) by considering CEO characteristics when ERP implemented to improve firm performance.

Upper echelon theory explains about how manager and executive can affect strategic decision making and its result. Upper echelon theory is formulated by Hambrick & Mason (1984) and discuss about managers' characteristics. Upper echelon theory suggests that manager assessment and interpretation are driven by cognitive, value, and perception functions. Individual rationality and psychology determines the behavioral (Hambrick, 2007). Rationality and psychology are not easy to be measured, demographic characteristics are usually used as observable proxy, like gender, education, age, or tenure. Upper echelon theory guides the explanation about CEO characteristics that can affect strategic decision making, include in ERP implementation.

The Moderating Role of CEO Gender on the Effect of ERP Implementation on Performance

Gender can describe the CEO behavior. When male and female do the same working tasks, they perform different way and method to finish their work. Since female have more stable

emotion (Wani & Masih, 2015) and risk averse characteristic (Croson & Gneezy, 2009) than male people, female CEO can implement complex technology such ERP system carefully. Female CEO also have multitasking ability (Ruderman et al., 2002). Multitasking ability can be used for effective integrated technology implementation such ERP system. Female CEO always depend on detail information (Anggraeni et al., 2016), so she can learn effectively about ERP system complexity. Jalbert et al. (2013) and Susanti et al. (2018) find that female CEO is able to increases performance higher than male CEO.

Previous researches find that gender give significant impact on decision making process. Female CEO is proved can generate higher performance than male CEO (Jalbert et al., 2013; Susanti et al., 2018), because she can manage the business risk (Croson & Gneezy, 2009) and has multitasking ability (Ruderman et al., 2002). ERP system has higher risk and can be managed well by female CEO. ERP implementation complexity also can be handled by female CEO that has multitasking ability. Female CEO also always counts on detail information (Anggraeni et al., 2016), so she can learn effectively about ERP system complexity. Despite of male person that has intention (Awa et al., 2011; Eze et al., 2011) and depend (Venkatesh et al., 2003) more on technology, female person has more effort to learn on a new technology than male one (Venkatesh et

al., 2003). Female CEO will implement ERP more effectively than male CEO to increases firm performance.

H₁: ERP implementation has positive effect on performance when firm led by female CEO

The Moderating Role of CEO Education on the Effect of ERP Implementation on Performance

Education level is a picture of CEO ability (Hambrick, 2007; Hambrick & Mason, 1984). Higher-educated level CEO has higher thinking complexity and innovation, so they can implement strategy effectively (Davila & Foster, 2007), include in ERP implementation. Cheng et al. (2010) find that higher-educated executives have higher performance.

CEO education level is important factor to determine the ability of performance improvement. Cheng et al. (2010) find that executive education level has positive effect on performance. Higher education level leads CEO to has ability to think new idea, complex issue, and innovative strategy (Davila & Foster, 2007). Since ERP is one of complex information technology system that has to be converged with firm internal system, CEO ability with higher education level is needed. Hambrick & Mason (1984) propose that because of their knowledge and skill, higher-educated executives are more likely to engage in innovation. Knowledge and skill of higher-educated CEO are needed to implement complex technology

innovation (Hambrick & Mason, 1984) such as ERP system (Grabski et al., 2011). Higher-educated CEO will implement ERP more effectively than lower one to increases firm performance.

H2: ERP implementation has positive effect on performance when firm led by higher-educated CEO

The Moderating Role of CEO Tenure on the Effect of ERP Implementation on Performance

CEO tenure describes the position period held by a person. Tenure is indicator of how much a CEO has firm-specific knowledge and experiences. Longer-tenured CEO has higher business knowledge and experience (Shakir, 2009). Better knowledge and experience lead longer-tenured CEO to have effective ability to execute and maintain better ERP implementation in order to increases performance. Shakir (2009) finds that CEO tenure has positive effect on long-term firm performance. Wu et al. (2005) find that CEO will invest more in innovation along with the tenure is increased, even though on a certain point longer tenure can lead to less innovative strategy implementation. Generally, longer tenure helps CEO to gain more related firm business operational knowledge and skill and make CEO ready to implement innovative strategy such as ERP system implementation.

H3: ERP implementation has positive effect on performance when firm led by longer-tenured CEO

The Moderating Role of CEO Age on the Effect of ERP Implementation on Performance

Despite the fact says that older CEO has better experience and effective way to increase performance, younger CEO tend to has new idea, move faster, and more innovative when make business decision (Wei et al., 2005). Bertrand & Schoar (2003) explain that older CEO is conservative and resist to change. It can make older CEO implement advance technology such ERP system ineffectively. Belenzon et al. (2019) find that young CEO generates more profitability than old CEO. Hiebl et al. (2017) explain that it is less likely for older CEOs to be educated well about ERP system in their time. It is more effective for younger CEO to implement ERP.

H4: ERP implementation has positive effect on performance when firm led by younger CEO

METODE

Research Sample

Research sample is manufacture firms listed in Indonesian Stock Exchange 2012-2018. Since 2012, *Keputusan BAPEPAM-LK Nomor: KEP-431/BL/2012* regulates the CEO profile disclosure more complete than previous regulation, so the research period will be followed in 2012 forward. Consideration of using manufacture firms is to avoid industry characteristic different that can affect risk and benefit of ERP

implementation. Total sample are 665 firm-years. Sample selection can be seen in table 1.

Table 1. Sample Selection

Criteria	Firm	Firm-Year
Manufacture firms listed in Indonesian Stock Exchange 2012-2018	123	861
Incomplete annual report	(1)	(7)
Change financial reporting period	(4)	(28)
Incomplete CEO profile	(23)	(161)
Total	95	665

Variables

Dependent variable is firm performance. Firm performance is measured by return on assets, calculated by net income divided by total assets. Return on assets shows the firm ability to generate earnings by using their assets. Independent variable is ERP implementation. ERP implementation measured by dummy variable, score 1 if firm implement ERP system, score 0 if otherwise. ERP implementation is seen in annual report disclosure.

Moderating variable is CEO characteristics; consist of gender, education, tenure, and age. CEO gender is measured by dummy variable, score 1 if CEO is female and score 0 if CEO is male. CEO education is measured by score of education; which are score 1 if CEO graduate from high school level, score 2 if CEO graduate from associate or vocational school level, score 3 if CEO graduate from bachelor degree,

score 4 if CEO graduate from master degree, score 5 if CEO graduate from doctorate degree (Qi et al., 2018). CEO tenure is measured by total number of years of CEOs held their position in a specific firm. CEO age is measured age of CEO in year. All of CEO characteristics data are accessed in CEO profile disclosure of annual report.

Control variables are firm size and operation cash flow. The bigger the firms, the larger resources had by firms and it easier to improve performance (Muzir, 2011). The higher operation cash flow, the higher available cash to invest in profitable investment. Size is measured by natural logarithm of total assets while operation cash flow is measured by total cash flow from operation divided by total assets.

Analysis Method

Hypothesis test uses regression analysis. ERP system implementation is not easily changing each year, so this research prefers to use random effect regression rather than fixed effect regression. As robustness test, this research performs common effect regression as well.

$$ROA = a + b_1ERP + b_2Gender \times ERP + b_3Education \times ERP + b_4Tenure \times ERP + b_5Age \times ERP + b_6Gender + b_7Education + b_8Tenure + b_9Age + b_{10}SIZE + b_{11}OCF + e \quad (1)$$

Where *ROA* is return on assets, *ERP* is enterprise resource planning

implementation, *Gender* is CEO gender, *Education* is CEO education, *Tenure* is CEO tenure, *Age* is CEO age, *SIZE* is firm size, *OCF* is operation cash flow.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2 shows the descriptive statistics about this research.

Table 2. Descriptive Statistics

		Implemen t ERP (N=238)	Not Implemen t ERP (N=427)	Full Sampl e
Mean	ROA	0.08	0.03	0.05
	ED	3.48	2.95	3.14
	TN	6.79	12.30	10.33
	AG	52.28	56.56	55.03
	SIZE	29.32	27.94	28.43
	OCF	0.08	0.06	0.07
Gende r	Male	224	397	621
	Femal e	14	30	44

Note: ROA = Performance; ED = CEO Education; TN = CEO Tenure; AG = CEO Age; SIZE = Firm Size; OCF = Operating Cash Flow

Table 2 shows that average return on assets (ROA) for total sample is 0.05. Average return on assets for firms that implement ERP is 0.08; while for firms that do not implement ERP is 0.03. Return on assets for firms that implement ERP is higher than return on assets for firms that do not implement ERP and significantly different with t-statistics 4.180 (significant in 0.01). As expected, ERP system is implemented more by higher-educated CEO, shorter-tenured CEO, younger CEO and statistically significant.

Regression Results

Table 3 presents the regression results of this research.

Table 3. Regression Results

Variable	Coefficient
ERP	0.132***
GN x ERP	0.024***
ED x ERP	0.011***
TN x ERP	0.001**
AG x ERP	-0.001***
GN	0.025
ED	0.016
TN	0.000
AG	0.001
SIZE	0.004
OCF	0.336*
Constant	-0.265
F-statistics	5.952*
Adjusted R ²	0.075

Notes:

ERP = Enterprise Resource Planning Implementation; GN x ERP = Interaction between CEO gender and ERP; ED x ERP = Interaction between CEO education and ERP; TN x ERP = Interaction between CEO tenure and ERP; AG x ERP = Interaction between CEO age and ERP; GN = CEO gender; ED = CEO education; TN = CEO tenure; AG = CEO age; SIZE = Firm size; OCF = Operation Cash Flow.

*, **, *** Significant at *p*-levels of 0.01, 0.05, 0.10 respectively.

Table 3 shows that ERP implementation has coefficient value 0.132439 (significant in 0.10). The result is consistent with Poston and Grabski (2001), Hayes et al. (2001), Hunton et al. (2003), Wier et al. (2007) who find ERP provide competitive advantages, such as productivity and efficiency, to increase firm performance.

Interaction between CEO gender and ERP implementation (Gender x

ERP) has coefficient value 0.024295 (significant in 0.10). It shows that H1, ERP implementation has positive effect on performance when firm led by female CEO, is accepted. Female CEO has better risk management, good multitasking ability, and more effort to learn new technology, so she can implement ERP system more effectively than male CEO to improve performance.

Interaction between CEO education and ERP implementation (ED x ERP) has coefficient value 0.011444 (significant in 0.10). **It shows that H2 which states that ERP implementation has positive effect on performance when firm led by higher-educated CEO is supported.** Higher-educated CEO has more knowledge and skill than lower-educated one. Knowledge and skill of higher-educated CEO can solve ERP system complexity to be implemented effectively, further, it can increase performance.

Interaction between CEO tenure and ERP implementation (TN x ERP) has coefficient value 0.001267 (significant in 0.05). **It shows that H3 which states that ERP implementation has positive effect on performance when firm led by longer-tenured CEO is supported.** Longer-tenured CEO has more firm-specific knowledge and skill than shorter-tenured one. It helps longer-tenured CEO to implement ERP system effectively and increase performance.

Interaction between CEO age and ERP implementation (AG x ERP) has coefficient value -0.001246

(significant in 0.10). **It shows that H4 which states that ERP implementation has positive effect on performance when firm led by younger CEO is supported.** Longer-tenured CEO has more firm-specific knowledge and skill than shorter-tenured one. It helps longer-tenured CEO to implement ERP system effectively and increase performance. Younger CEO is familiar with innovation, fresh idea, and risky investment. It helps younger CEO to implement risky and innovative strategy such ERP system effectively to improve firm performance.

Additional Test: ERP Implementation Period

ERP system investment include in long term investment. It is not rapidly giving significant impact on business operational improvement. However, long term investment such ERP implementation usually evaluated at least after 3 to 5 years (Kováč & Kádárová, 2014). This research examines the moderating role of CEO characteristics in each alternative ERP implementation period of 3 to 5 years to improve performance which presents in the Table 4.

Table 4. Regression Results based on the ERP Implementation Period

Variable	Coefficient		
	≥ 3 years ERP Implementation	≥ 4 years ERP Implementation	≥ 5 years ERP Implementation
ERP	0.096**	0.100**	0.028**
GN x ERP	0.028*	0.031***	0.007***
ED x ERP	0.012***	0.010**	0.026**
TN x ERP	0.000***	0.001*	0.003*

Age x ERP	-0.000**	-0.000***	-0.002**
GN	0.022	0.022	0.017
ED	0.017***	0.017***	0.014
TN	0.000	0.000	-9.39E-05
AG	0.001	0.001	0.001
SIZE	0.004	0.004	0.009**
OCF	0.351*	0.352*	0.337*
Constant	-0.232	-0.227	-0.368
F-statistics	6.429*	6.494*	5.974*
Adjusted R ²	0.082	0.083	0.076

Notes:

ERP = Enterprise Resource Planning Implementation; GN x ERP = Interaction between CEO gender and ERP; ED x ERP = Interaction between CEO education and ERP; TN x ERP = Interaction between CEO tenure and ERP; AG x ERP = Interaction between CEO age and ERP; GN = CEO gender; ED = CEO education; TN = CEO tenure; AG = CEO age; SIZE = Firm size; OCF = Operatin Cash Flow. *, **, *** Significant at *p*-levels of 0.01, 0.05, 0.10 respectively.

Table 4 shows that interaction between gender and ERP implementation has coefficient value 0.028305 (significant in 0.01) for at least 3 years ERP implementation, 0.031052 (significant in 0.10) for at least 4 years ERP implementation, 0.007784 (significant in 0.10) for at least 5 years ERP implementation. Interaction between education and ERP implementation has coefficient value 0.012124 (significant in 0.10) for at least 3 years ERP implementation, 0.010282 (significant in 0.05) for at least 4 years ERP implementation, 0.026532 (significant in 0.05) for at least 5 years ERP implementation. Interaction between tenure and ERP implementation has coefficient value 0.000954 (significant in 0.10) for at least 3 years ERP implementation, 0.001181 (significant in 0.01) for at least 4 years ERP implementation, 0.003014 (significant in 0.01) for at least 5 years ERP implementation. Interaction between age and ERP implementation

has coefficient value -0.000397 (significant in 0.05) for at least 3 years ERP implementation, -0.000561 (significant in 0.10) for at least 4 years ERP implementation, -0.002615 (significant in 0.05) for at least 5 years ERP implementation. The results are consistent with the main result that CEO characteristics have effect on ERP effectiveness to improve performance.

Additional Test: ERP Experience

Adoption period of ERP system vary between a firm to another. Firm experience about ERP implementation also can give effect on firm performance. Elsayed et al. (2019) find that ERP utilization period help firm to achieve optimal productivity. This research also examines the number of ERP implementation period for implemented ERP sample group only which the results are presented in Table 5. The numbers of sample are 238 firm-years.

Table 5. Regression Results based on the ERP Experience

Variable	Coefficient
ERP Exp	0.008***
GN x ERP Exp	0.001**
ED x ERP Exp	0.007***
TN x ERP Exp	0.000***
AG x ERP Exp	-0.000*
GN	-0.000
ED	-0.055
TN	-0.001
AG	0.003
SIZE	0.000
OCF	0.532*
Constant	0.063
F-statistics	5.673*
Adjusted R ²	0.030

Notes:

ERP Exp = Enterprise Resource Planning Experience; GN x ERP Exp = Interaction between CEO gender and ERP Experience; ED x ERP Exp = Interaction between CEO education and ERP Experience; TN x ERP Exp = Interaction between CEO tenure and ERP Experience; AG x ERP = Interaction between CEO age and ERP Experience; GN = CEO gender; ED = CEO education; TN = CEO tenure; AG = CEO age; SIZE = Firm size; OCF = Operatin Cash Flow. *, **, *** Significant at p-levels of 0.01, 0.05, 0.10 respectively.

Table 5 shows that interaction between CEO gender and ERP implementation period (GN x ERP Exp) has coefficient value 0.001512 (significant in 0.05). Interaction between CEO education and ERP implementation period (ED x ERP Exp) has coefficient value 0.007062 (significant in 0.10). Interaction between CEO tenure and ERP implementation period (TN x ERP Exp) has coefficient value 0.000264 (significant in 0.10). Interaction between CEO age and ERP implementation period (AG x ERP Exp) has coefficient value -0.000342 (significant in 0.01). The results are consistent with the main result that CEO characteristics have effect on ERP experience period to improve performance.

Robustness Test

This research runs common effect regression as robustness test by following classical assumption test. Common effect regression result is in Table 6.

Table 6. Regression Test (Common Effect)

Variable	Coefficient
ERP	0.122**
GN x ERP	0.024***
ED x ERP	0.0039**
TN x ERP	8.44E-05***
AG x ERP	-0.001**
GN	0.020
ED	0.014
TN	0.000
AG	0.001***
SIZE	0.002
OCF	0.450*
Constant	-0.200
F-statistics	11.783*
Adjusted R ²	0.151
Sig. of Serial Correlation LM Test	0.389
Sig. of White Test	0.998
VIF Value	< 10

Notes:

ERP = Enterprise Resource Planning Implementation; GN x ERP = Interaction between CEO gender and ERP; ED x ERP = Interaction between CEO education and ERP; TN x ERP = Interaction between CEO tenure and ERP; AG x ERP = Interaction between CEO age and ERP; GN = CEO gender; ED = CEO education; TN = CEO tenure; AG = CEO age; SIZE = Firm size; OCF = Operatin Cash Flow. *, **, *** Significant at *p-levels* of 0.01, 0.05, 0.10 respectively.

Table 6 shows that significant value of Serial Correlation LM Test is 0.389. This result indicates that there is no autocorrelation problem. Significant value of White Test is 0.998 indicate that there is no heteroscedasticity problem. Value of VIF is below 10 indicates that there is no multicollinearity problem.

Interaction between CEO gender and ERP implementation (GN x ERP) has coefficient value 0.024654

(significant in 0.10). Interaction between CEO education and ERP implementation (ED x ERP) has coefficient value 0.003923 (significant in 0.05). Interaction between CEO tenure and ERP implementation (TN x ERP) has coefficient value 8.44E-05 (significant in 0.10). Interaction between CEO age and ERP implementation (AG x ERP) has coefficient value -0.001346 (significant in 0.05). The results are consistent with random effect regression in the main analysis which shows that CEO characteristics have effect on ERP implementation effectiveness to improve performance.

CONCLUSION

This research is aimed to fill gap of previous findings about inconsistent result of ERP implementation on performance. By considering CEO characteristics, this research answers the inconsistent of ERP implementation benefit for firm, especially to improve firm performance. Based on the random effect regression test, ERP implementation has positive effect on performance when the firm led by female, higher-educated, longer-tenured, and younger CEO. It indicates that CEO characteristics describe the CEO ability, knowledge, and skill to implement complex and risky technology investment such ERP system.

This research has limitation. First, this research only measures CEO characteristics by demographic aspects and do not perform deeper

characteristics assessment, for example by questionnaire or interview. Second, this research does not make evaluation of how ERP implemented and which parts or functions of firm that enjoy the benefits of productivity and efficiency. This research has implication for firm, especially for ERP implementer firm; to make policy about CEO selection by considering gender, age, education, and tenure; so, ERP can be implemented effectively.

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