

The influence of information security technostress on the job satisfaction of employees

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Keywords

Information Security, Technical Security, Techno-Stress, Job Satisfaction

Abstract

Information security is an important activity which is vital for corporate or organizational activities. However, focusing only on the strengthening for the performance of information security may act as a factor increasing the techno-stress the members of the organization feel.

This study inquired into the impacts of information security techno-stress on individual job satisfaction and empirically verified the relationship between information security techno-stress and individual job satisfaction, preceding factors and results, regarding how to use information security effectively.

The results of the analysis, the strengthening of information security caused techno-stress, and the information security techno-stress had negative impacts on individual job satisfaction. As security is inclined to technical countermeasures, security technology is further strengthened, and accordingly, the techno-stress of the members of the organization increases, while on the other hand, individual job efficiency decreases, which is judged that this will have negative impacts on the personal performance in the organization.

1. Introduction

For a long time, corporate have pursued various methods to prevent and cope against the information leakage, continuing the enforcement of security continuously. The information security achievements have enhanced, but the stress during carrying out the tasks by the workers is increasing much further. Such stress is referred to as information security technostress, and the information security technostress of the organization members may face the serious problem of deterring the productivity of tasks.

Information is a fundamental factor in the strategies and achievement of goals of corporate and organizations. Corporations are enforcing information security to protect important intellectual property and to prevent security accidents, such as leakage of personal information. On the other hand, as the managerial, technological, and physical security is enforced within the corporate, the roles of information security is being enlarged, and due to responsibilities and duties that must be kept while carrying out tasks, stress is increasing.

As additional managerial tasks increase due to information security, from the frequent application of security technology and various directions, the amount of work is increasing, causing considerable stress to the workers. The organization must thus study the methods to cope against the stress of the members to maintain not only the job efficiency but effectiveness, and make considerations to alter this to a constructive direction (Park and Im, 2012).

This research has the research topic of the process of information security affecting the job satisfaction of the members, and especially identifies the influence of technological security of information security to technostress to analyze whether it is connected to the job satisfaction. Also, exactly which factors influence the job productivity of the members is to be identified as well. Based on the identified research result, the implications are deducted, and solutions to alleviate technostress in the future are to be suggested. In other words, by decreasing the drawbacks, and composing a solution to emphasize the strengths, solutions to process the information security technostress in the method of processing the tasks of the organization members in the most effective and efficient way are to be suggest

2. Theoretical Background

2.1 Technostress

To quote the definition of stress by Ayyagari et al., (2001), “stress occurs when the individuals are carrying out various responsibilities that have the possibility of conflicting, or when experiencing inadequacy in the difficulties or complexities of the current tasks (Tarafdar et al., 2007)”, and it is mentioned that such failures often cause physical illness, fatigue, absence and switching jobs, and lead to the mental disorder that may deter the achievement of tasks.

Technostress is occurring in situation the organization members may not have the skills and competencies needed in the organization are performing their tasks. Technostress can be defined as individual adaptation of the reaction to stimulants when excessive psychological and physical demands are given. (Park and Im, 2012).

The development of the information communication technology is granting the existing corporations with much opportunity. However, new problems are occurring in intellectual, psychological, physical or social aspects. Therefore, in management of the corporation effectively, technostress is becoming a barrier (Park and Im, 2012).

Tarafdar et al. (2007) measured the items causing technostress and identified that the causes of these technostress have significant influence on the job productivity and role stress. There are various causes of technostress suggested in the existing research, but generally, the most general causes of stress are the following suggested by Tarafdar et al. (2007): Techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty. First of all, techno-overload is the burden felt when individuals need to carry out tasks more fast and more tasks. Secondly, techno-invasion refers to the circumstance of creating the environment in which the individuals are able to work anytime, making the workers be overly focused in work. Thirdly, techno-complexity refers to the circumstance in which, with the introduction of new technology, due to the gap between the technological development and the abilities of individuals, the various learning, and time and effort for understanding are pressurized. Fourthly, techno-insecurity refers to the anxiety of losing jobs due to being threatened to be replaced by the new technology. Fifthly, techno-uncertainty refers to the circumstance of being agitated and uncertain due to the continuous changes and development of the security technology. When the five causes are recognized, positive or negative effects may be caused in job achievements.

2.2 Information Security

Information security is composed of the 3 aspects of technological, physical and managerial control. As managerial security, there are the existence of the information protection policy, creation of information protection organization and allotment of related responsibilities, identification and categorization of important assets, management of recruiting, hiring and retiring workers, and continuous plans for the continuous services of core tasks in cases of crisis and regular inspections and checks in case of physical controls. In technological control, there are the management of the computers and the networks, system access control, system development and the control of maintenance, and as physical control, there are preservation and management of the computer room and equipment (Jeong and Jeong, 2011).

Table1. Definition of Information Security Activities

Information Security Activity	Detailed Definition
Managerial Security	<ul style="list-style-type: none"> Existence of the information protection policy, creation of information protection organization and allotment of related responsibilities, identification and categorization of important assets, management of recruiting, hiring and retiring workers, and continuous plans for the

	continuous services of core tasks in cases of crisis and regular inspections and checks in case of physical controls
Technological Security	▪Management of the computers and the networks, system access control, system development and the control of maintenance
Physical Security	▪Preservation and management of the computer room and equipment

2.3. Technological Security

Many corporations are enforcing technological control for correct information security recognition and action. Through this, the technological stress of the organization members would become greater. Among the alternatives for information security, the technological security is being relied upon. This is because though the costs are high, it is a technological alternative in the fast and convenient method (Park and Im, 2012)

Information security recognizes that the responsibility of security is on the individuals and emphasizes the technological security to the organization members. However, as the actions and responsibilities on the technological security is conveyed in addition to the existing task responsibilities, and the stress felt by the organization members is not limited to the tasks, but is extended to technological stress as well (Park and Im, 2012). Therefore, the following hypothesis may be constructed.

H1.1) The enforcement of information security (technological security) will have positive (+) influence on the task overload.

H1.2) The enforcement of information security (technological security) will have positive (+) influence on the invasion of privacy.

H1.3) The enforcement of information security (technological security) will have positive (+) influence on the complexity of tasks.

H1.4) The enforcement of information security (technological security) will have positive (+) influence on the instability of tasks.

H1.5) The enforcement of information security (technological security) will have positive (+) influence on the uncertainty of tasks.

The technological security of information technology must be provided effectively in long-term perspectives. However, the companies may anticipate negative influence on the job satisfaction of individuals when the technological security is operated continuously. Therefore, the following hypothesis may be composed.

H2) The enforcement of information security (technological security) will have negative (=) influence on the job satisfaction of individuals.

2.4 The job satisfaction of individuals

The achievement of the organization and the achievement of the individual are not separate. They have major implications for each other, and to cause the achievement of the organization, the work productivity of the individuals is essential. Therefore, the work productivity of individuals is linked to the job satisfaction, maximizing the work productivity, and such achievement of individuals cause the achievement of the organization. Therefore, if the technostress influences the job satisfaction of individuals, the achievement of the organization may be influenced as well. Here, the job satisfaction of the individual being influenced by the information security technostress is researched.

The corporate must introduce information security technology, and the organization members have no choice but to follow this decision. Among the information security technology, the technological security refers to the activity of the corporations' network and internal system access

rights and the activity of adhering to them, and is an activity of close relationship with tasks. In this case, as the organization members must adjust to the information security technology, they feel objection against the information security technology.

Technostress may deter the job satisfaction of individuals as the 5 following conditions caused by the application of information security technology are applied.

First of all, due to work overload, the managers communicate more information necessary, and have the tendency of receiving more information than the amount that they are able to process and use efficiently. As it is possible, they feel pressurized to acquire information security technology and to process them. Thus, they must input more time and effort into information security technology. At the same time, they cannot check whether the information security technology is actually useful, and this causes dissatisfaction on the information security technology that they are using. Invasion of privacy makes them feel that they are never freed from the information security technology, or that they are always under surveillance, or that they are always waiting, and that their space has been invaded. This causes dissatisfaction on the information security technology that they use. The complexity of task means that the users must leave out other organizational tasks and input much time and effort to acquire and learn the information security technology. The most of the users, in the process of discovering the complexity of the information security technology and the variety of the functions, do not understand the actual usage or why they must use the technology.

The anxiety in work makes the users feel burdened when they have not coped appropriately to work process or the necessity of education related to the new and changed information security technology. The workers, even if the information security technology that they have recently learned or have been used is exterminated, must learn new technology and manipulation regularly. The necessity of continuous acquisition of information security technology leads to the dissatisfaction of users. Uncertainty in work causes burden on the security leakage by individuals. Also, through security leakage, they feel the nervousness that they may be disadvantaged or fired.

The organization members experiencing a high degree of technostress have the possibility of lowered of productivity, may cause accidents related to tasks, may have frequent absences or tardiness, or may even switch jobs. In other words, technostress may deter not only the job satisfaction of individuals but the achievement of the organization (Sankar and Natale, 1990). Technostress may be caused from the enforcement of information security, and the responsibilities of the individuals may be deterred to influence productivity negatively. Therefore, the next hypotheses are suggested.

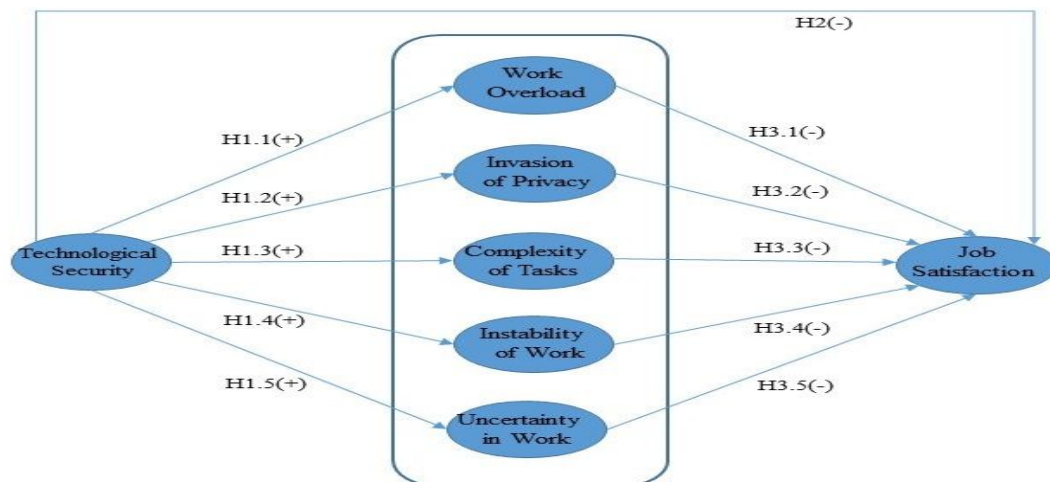


Figure1.Research Model

- H3.1) Work overload will have negative (-) influence on the job satisfaction of individuals.
 H3.2) Invasion of privacy will have negative (-) influence on the job satisfaction of individuals.
 H3.3) Complexity of tasks will have negative (-) influence on the job satisfaction of individuals.
 H3.4) Instability of work will have negative (-) influence on the job satisfaction of individuals.
 H3.5) Uncertainty in work will have negative (-) influence on the job satisfaction of individuals.

To suggest a research model centered on the literature review and the hypothesis, it is as Figure 1.

3. Analysis

3.1 Data collection

The survey was conducted in the method of actually visiting the surveyed corporations to explain the reasons of the survey, and by retrieving the written surveys, and was conducted on the workers and managers of corporations utilizing technological security. The demographic analysis result of the answerers is as Table2.

Table2. Demographic Analysis Result

Category		Frequency	Answer Proportion (%)
Gender	Male	90	61.2%
	Female	57	38.8%
Age	20s	33	22.4%
	30s	66	44.9%
	40s	44	29.9%
	50s	4	2.7%
Education	High School Graduate	5	3.4%
	College Graduate	32	21.8%
	University Graduate	92	62.6%
	Masters	17	11.6%
	Ph.D	1	0.7%
Corporation Name	A Corporation	40	27.2%
	B Corporation	28	19.0%
	C Corporation	28	19.0%
	D Corporation	24	16.3%
	E Corporation	11	7.5%
	F Corporation	9	6.1%
	Others	7	4.8%
Position	Executive	2	1.4%
	Department Head	12	8.2%
	Department Deputy Head	19	12.9%
	Section Chief	42	28.6%
	Deputy Section Chief	18	12.2%
	Worker	54	36.7%

3.2 Measurement Result

The model applied in this research, as a measurement model mixing the reflective indicator and formative indicator, as for the reflective indicator, the internal reliability of the each measured variables forming a potential variable must be secured (Wasko and Faraj, 2005), and in case of formative indicators, additional verification of reliability is not required, (Kim, 2012). Reliability refers to gaining integrated answer when measuring the same concept repeatedly with equal or similar measuring tools (Wasko and Faraj, 2005). The reliability of the reflective indicator

measurement model may be evaluated by the factor load, Cronbach's alpha, CR(Composite Reliability) or AVE (Average Variance Extracted) and other various methods.

The Cronbach's alpha value and CR may be secured of reliability by each potential variables when the 0.7 or higher (Fornell and Larcker, 1981), and 0.5 or higher for AVE (Chin et al., 1997; Fornell and Larcker, 1981). Also, the reliability is secured when the factor load of each items is 0.6 or higher, but for ideal research, it must be 0.7 or higher (Chin, 1998).

In this research, Cronbach's alpha, CR, and AVE were used to measure the reliability of the variables, but as suggested in Table 3, the reliability of some Cronbach's alpha is weak, yet the variables of reflective indicators included in this research has secured reliability.

Table3.The reliability of Each Variable

Variable	Composite Reliability	Cronbachs Alpha	AVE
Technological security(techno_security)	0.859	0.800	0.552
Complexity of work(stress_complexity)	0.948	0.930	0.783
Anxiety in work(stress_insecurity)	0.762	0.620	0.528
Invasion of privacy (stress_invasion)	0.845	0.758	0.578
Work overload (stress_overload)	0.929	0.908	0.685
Uncertainty in work (stress_uncertainty)	0.772	0.562	0.531
Jobsatisfaction (satisfaction)	0.924	0.905	0.604
Required value	$\alpha > 0.7$	CR > 0.7	AVE > 0.5

The intensity or the validity of the measured model may be evaluated by measuring the convergent validity. As for the reflecting indicators, the convergent validity refers to the extent of convergence of the items measuring the equal potential variables and the items measuring other potential variables, and means that there is a high correlation between the same concepts measured in different methods. The convergent validity is secured when the AVE value of each variable is 0.5 or higher, or when the factor load of the respectively measured items or 0.7 or higher and statistically significant, and lastly, when the reliability of each variable is 0.8 or higher (Fornell and Larcker, 1981).In the measured model of this research, the AVE value of all variable is 0.5 or higher, and the factor load of variable excluding e29, f34 and f35 is 0.7 or higher and statistically significant. Therefore, the convergent validity of each variable excluding e29, f34, and f35 may be evaluated to have been secured. The factor load of the measured items of the reflective indicator is as Table4.

Table4.The factor load of the measured items of reflective indicator

	techno_se curity	stress_ov erload	stress_inv asion	stress_co mplexity	stress_ins ecurity	stress_un certainty	satisfactio n
a4	0.848	0.382	0.332	0.306	0.347	0.071	0.176
a5	0.725	0.193	0.271	0.267	0.185	0.067	0.191
a6	0.747	0.152	0.197	0.241	0.145	-0.176	0.071
a8	0.785	0.310	0.214	0.264	0.341	-0.108	0.096
b13	0.223	0.761	0.455	0.357	0.464	0.235	0.272
b14	0.270	0.801	0.541	0.638	0.556	0.337	0.445
b15	0.409	0.837	0.593	0.578	0.554	0.233	0.383
b16	0.222	0.849	0.487	0.513	0.550	0.188	0.414
b17	0.146	0.849	0.533	0.544	0.538	0.225	0.405
b18	0.416	0.863	0.598	0.582	0.605	0.196	0.421

c19	0.275	0.508	0.833	0.460	0.414	0.219	0.331
c21	0.311	0.636	0.775	0.768	0.624	0.364	0.456
c22	0.208	0.404	0.830	0.515	0.463	0.289	0.350
d23	0.256	0.469	0.685	0.810	0.575	0.347	0.511
d24	0.341	0.600	0.667	0.896	0.679	0.340	0.533
d25	0.319	0.586	0.633	0.923	0.708	0.386	0.586
d26	0.366	0.665	0.676	0.885	0.769	0.352	0.542
d27	0.262	0.590	0.624	0.908	0.700	0.366	0.621
e28	0.373	0.654	0.656	0.784	0.951	0.276	0.553
e29	0.129	0.381	0.286	0.405	0.659	0.222	0.243
f34	-0.009	0.310	0.374	0.371	0.420	0.688	0.329
f35	-0.042	0.075	0.195	0.244	0.055	0.679	0.227
f36	-0.021	0.201	0.222	0.262	0.144	0.810	0.359
g37	0.070	0.371	0.341	0.539	0.477	0.285	0.782
g38	0.121	0.396	0.392	0.485	0.480	0.357	0.838
g40	0.180	0.380	0.440	0.553	0.434	0.311	0.851
g41	0.097	0.311	0.323	0.468	0.361	0.411	0.819
g42	0.158	0.456	0.458	0.562	0.450	0.453	0.865
g43	0.237	0.428	0.386	0.506	0.429	0.299	0.778

4. Analysis Result

As the reliability and the validity of the measured model of the research has been secured, PLS analysis was conducted to verify the relationship among each concepts suggested in the research model. In PLS analysis, the model utilizes the same method for the reflective indicator model and the formative indicator model. It may be evaluated with the size of the path coefficients, and by dependent variables, sign, t-value and the leading variables, and the analysis results of the model of this research model is as Figure 2.

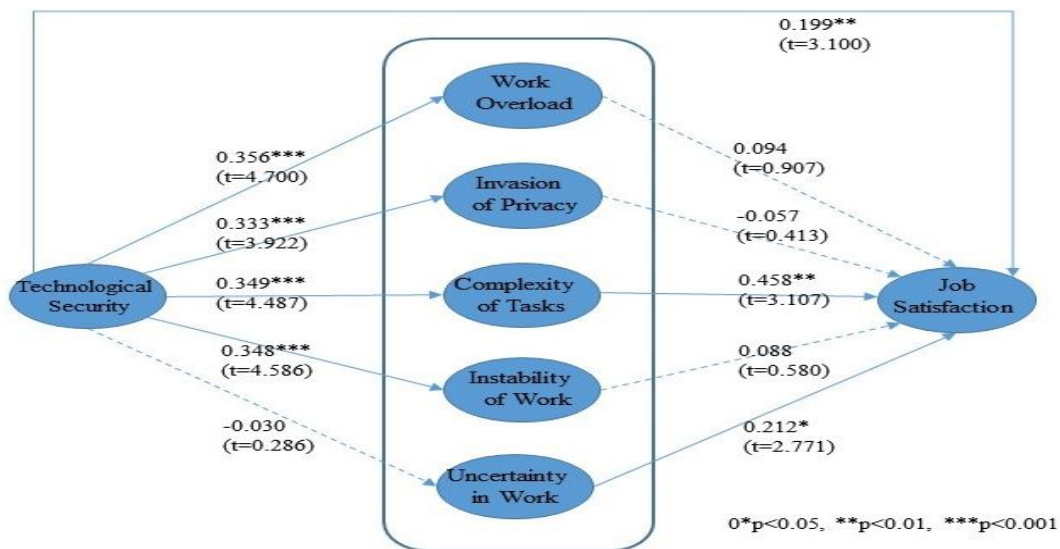


Figure2. Research Model

Among the 11 hypothesis, 7 hypotheses were statistically significant.

- H1.1) The enforcement of technological security will have positive (+) influence on the work overload.
- H1.2) The enforcement of technological security will have positive (+) influence on the invasion of privacy.
- H1.3) The enforcement of technological security will have positive (+) influence on the complexity of work.
- H1.4) The enforcement of technological security will have positive (+) influence on the instability of work.
- H1.5) The enforcement of technological security will have positive (+) influence on the uncertainty of work.

The hypothesis that enforcement of technological security of information technology was statistically significant in work overload (path coefficient: 0.356, $t=4.700$), invasion of privacy (path coefficient: 0.333, $t=3.922$), complexity of work (path coefficient: 0.349, $t=4.487$), instability of work (path coefficient: 0.348, $t=4.586$) in the significance level of 0.001, and through each path coefficient, the technostress is influenced the most. On the other hand, the hypothesis that the enforcement of technological security of information security (path coefficient: -0.30, $t=0.286$) did not have statistically significant results.

H2) The enforcement of technological security will have negative (-) influence on the job satisfaction of individuals. The hypothesis that the technological enforcement of information security will have influence on the job satisfaction of individuals (path coefficient: 0.199, $t=3.110$) was statistically significant on the significance level of 0.01, and means that the enforcement of technological security of information security on the job satisfaction of individuals negatively.

- H3.1) Work overload will have negative (-) influence on the job satisfaction of individuals.
- H3.2) Invasion of privacy will have negative (-) influence on the job satisfaction of individuals.
- H3.3) Complexity of work will have negative (-) influence on the job satisfaction of individuals.
- H3.4) Anxiety in work will have negative (-) influence on the job satisfaction of individuals.
- H3.5) Uncertainty in work will have negative (-) influence on the job satisfaction of individuals.

The hypothesis that the complexity of work will have negative influence in the job satisfaction of individuals (path coefficient: 0.458, $t=3.107$) in the job satisfaction of individuals was statistically significant in the significance level of 0.01, and the hypothesis that complexity of work will have negative influence on the job satisfaction of individuals (path coefficient: 0.458, $t=3.107$) was statistically significant on the significance level of 0.01, and the hypothesis that uncertainty of work will have negative influence on the job satisfaction of individuals (path coefficient: 0.212, $t=2.771$) had significant results on the convenience level of 0.05. However, the hypothesis that work overload (path coefficient: 0.094, $t=0.907$), invasion of privacy (path coefficient: -0.057, $t=0.413$), and uncertainty in work (path coefficient: -0.057, $t=0.413$) did not have statistically significant results. The results of validation of hypothesis is as Table 4.

5. Conclusion

This research has validated the influence on the task satisfaction of individuals by technostress. Through the prior research that the causes of technostress directly influence the achievement of the organization (Im and Han, 2013) and the prior theoretical basis that technological stress influences information security (Park and Im, 2012), research model was designed to identify how information security directly influences the job satisfaction of individuals.

Though research based on information security was made, there were no research identifying the relationship of work satisfaction of individuals by identifying the characteristic of information security. The analysis was made for the technological security among the 3 activities of information

security, and by identifying technostress into five types according to factor, research model was designed, and the research result is as follows.

First of all, it was identified that the technological security of information security had positive (+) influence on the technostress. However, among the influences of technological security on technostress, the uncertainty of work, the burden about security leakage was not selected.

Secondly, it was verified that the technological security if information security had negative (=) influence on the job satisfaction of individuals. In enforcing the technological security or introducing new systems, the new systems are not generalized but causes stress, and this means that through the technological complement of the information security, negative influence may be exercised on the job satisfaction of individuals.

Thirdly, it was verified that technostress has negative(-) influence on the job satisfaction of individuals. Organization members experiencing a high degree of technostress may have negative influence on job satisfaction, and it seems that the burden of the complexity of security technology has negative influence on the job satisfaction. However, work overload, invasion of privacy, and unstable work were not selected.

In summing up the analysis result, the enforcement of information security causes technostress, and negative influence is exercised on the job satisfaction of individuals due to information security techno stress, and this is because as the security is focused on the technological alternatives, the security technology is enforced, and the technostress of the organization members are increased, and the efficiency of individuals is deterred.

In the above results, the organization must establish specific means to reduce the technostress felt by the organization members, and to carry them out within the overall organization. By introducing or applying new security technology, the factors that may influence the work productivity of the organization members and the circumstance must be considered to make enhancements.

This research has the following limitations. First, because the variables measured by the survey methodological limitations are likely to have perceived the error implied answers of the respondents. Secondly, this research was conducted for the organization utilizing information security, and there are organizations introducing information security that the cognition on the information security stress by the organization members may be low. Thirdly, in this research, the demographic characteristics and the characteristics of the members were not considered, and various variables such as the cultural difference of the organizations and the environment of usage were not considered. The environment including the characteristic and culture of individuals has reciprocity with the environment (Bandura, 1997). In consideration of the various variables, more specific results on the information security technostress on the job satisfaction of individuals would be able to be deducted. Lastly, this research conducted analysis with the information security as the focus, and if the accumulation of influence and change of achievement or each organization member, the overall analysis on the information security and usage would be possible. Thus, by analyzing how the relationship of the dependent variables shifts according to the changes of the independent variable, more in-depth research results may be anticipated.

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