

The mechanism between turnover intention and turnover action: A dynamic model's construction using Laplace transform

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Abstract. This conceptual paper explains the possibility of sorting Allen and Meyer organizational commitment measure into boost converter model and create a dynamic modelling, in order to simulate employees' turnover action. The study suggests input data into all six possible models and finding out the best fit model. Then discourse analysis of expert opinion and card sorting exercise will be deployed for result's triangulation. Laplace transform is suggested for processing the equations. R and OpenModelica are the proposed tools for quantitative data analysis.

1. Introduction

Employees' turnover action (TA) is a decisive action which potentially has serious impacts on organizations and individuals [1]. Lee and Mitchell [2] developed four path ways, which explained the decision-making process of TA. The path ways are 1) expected shocks (personal), 2) negative workplace shocks, 3) unsolicited job inquiry shocks and 4) dissatisfaction-induced turnover. Moreover, the types of TA can be categorized into four ways 1) avoidable voluntary turnover, 2) unavoidable voluntary turnover, 3) avoidable involuntary turnover and 4) unavoidable involuntary turnover [3]. Furthermore, TA is a time-specific event marked by physical separation from organization [4]. An employee had experienced dissatisfaction from the job may increase the level of turnover intention (TI) [1]. The TI, however does not necessarily lead to TA [5].

Organizational commitment (OC) is a desire willingness to behalf and to belong to a community or an organization. Three components were proposed to describe the psychological item, 1) affective, 2) continuance and 3) normative [6].

The relationships between OC and TI have been widely studied. Due to high level of TI do not always results quit (TA) [7], studies in turnover topic in most of the case limit their vision on TI. The relationship between OC and TA remains unknown. This study takes this as the research gap, focusing on TA, attempts to investigate the mechanism of how OC affects TA.

2. Literature Review

The latest literature suggests a numbers of research directions which match the proposed research gap. Kim et al. [8] suggested that the future study should focus on individual personal variables. The interaction between individual and organizational factors need to be explored. Macke and Genari [9] highlighted that non-job-related factors such individual needs, environment and family need to be considered holistically. Moreover, they argued that certain levels of flexibility should be provided on determine whether a variable is a mediator or a final objective. Batistic [10] illustrated that employees' and organizations' time dynamic and non-routine behaviours were easily overlooked for observation. Zhu and Warner [11] revealed that convergence and divergence dynamic processes need for further investigation. Turner et al. [12] again, highlighted the importance of human resource research. Kappelides and Spoor [13] warned that employees' personality and character differences

may affect the data, for which in-depth investigation and understanding are urged. The suggested future research can be summarized as table 1.

Table 1. Research gaps suggested by latest literature.

Latest literature	Future research suggestions
Kim et al. (2019)	Individual personal variables The interaction between individual and organizational factors.
Macke and Genari (2019)	Non-job-related factors (individual needs, environment and family) Flexibility of determining mediator and final objective
Batistic (2018)	Time dynamic and non-routine behaviour
Zhu and Warner (2019)	Convergence / divergence dynamic processes
Turner et al. (2019)	The importance of human resource research
Kappelides and Spoor (2018)	Personality and character differences affect data

Therefore, this study intends to discuss the possibility of applying the boost converter equation into employee turnover context.

3. Methods

3.1 Equations

The study adopts Gottman et al. [14] equation as logic equation. Employee’s TA is considered as the result of a game that is played between employee and the environment around that person. The logic equation can be listed below:

$$\begin{aligned}
 EE_{t+1} &= ee + r_{ee} EE_t + I_{(ER)(EE)} ER_t \\
 ER_{t+1} &= er + r_{er} ER_t + I_{(EE)(ER)} EE_t
 \end{aligned}
 \tag{1}$$

- EE_{t+1} : Employee’s reaction
- ee : Employee’s mood during OFF time
- $r_{ee} EE_t$: Employee’s mood during ON time
- $I_{(ER)(EE)} ER_t$: Employer’s influence on employee
- ER_{t+1} : Employer’s reaction
- er : Employer’s attitude towards to employee when as a newcomer
- $r_{er} ER_t$: Employer’s attitude towards to employee when used to the job
- $I_{(EE)(ER)} EE_t$: Employee’s influence on employer

Electronic engineering has three basic elements, which are inductance, capacitance and resistance. The three key aspects of organizational commitment can be listed following: affective, continuance and normative [6]. Base on Lee and Mitchell [2] shocking theory, employee’s quitting decision-making process is like boost converter model very much (Figure 1). Employers policy change rings a “shock” to the employees. If the “shock” is significant enough, then it would trigger the “switch” to be disconnected. Once it is disconnected, the energy that was preserved in the system will release. If the preserved amount of energy was sufficient for charging the “resistance”, then the employee will leave.

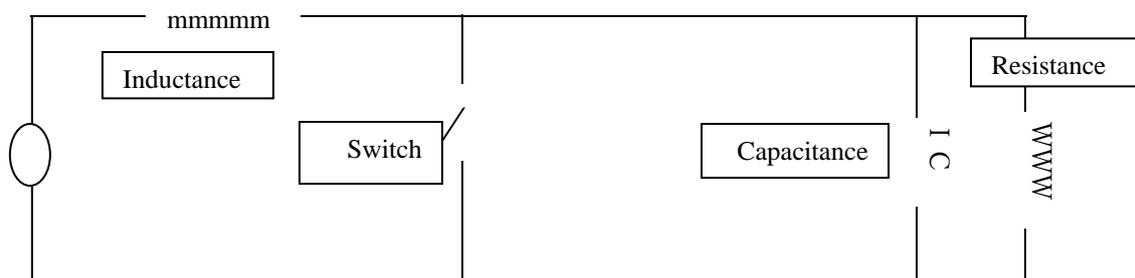


Fig. 1. Boost converter model

Thus, the operational equation is as following:

When switch is connected, get $i(t)$, assume $i(0)=0$

$$V_{supply} - L \frac{di}{dt} = 0$$

(2)

When switch is disconnected, get $i(t)$, assume $i(0)=0$

$$\text{Loop 1: } V_{supply} - L \frac{di}{dt} - \left(\frac{1}{C} \int i_1 dt - \frac{1}{C} \int i_2 dt \right) = 0$$

$$\text{Loop 2: } -Ri - \left(\frac{1}{C} \int i_2 dt - \frac{1}{C} \int i_1 dt \right) = 0$$

Then between OC's affective, continuance and normative factors, and electronic engineering's inductance, capacitance and resistance, there are six possible combinations can be listed.

Table 2. Six possible models.

Model I		Model II		Model III	
Resistance ($e=iR$)	Affective	Resistance ($e=iR$)	Continuance	Resistance ($e=iR$)	Normative
Capacitance ($e=(1/C)\int(i)dt$)	Continuance	Capacitance ($e=(1/C)\int(i)dt$)	Normative	Capacitance ($e=(1/C)\int(i)dt$)	Affective
Inductance ($e=L(di/dt)$)	Normative	Inductance ($e=L(di/dt)$)	Affective	Inductance ($e=L(di/dt)$)	Continuance
Model IV		Model V		Model VI	
Resistance ($e=iR$)	Affective	Resistance ($e=iR$)	Continuance	Resistance ($e=iR$)	Normative
Capacitance ($e=(1/C)\int(i)dt$)	Normative	Capacitance ($e=(1/C)\int(i)dt$)	Affective	Capacitance ($e=(1/C)\int(i)dt$)	Continuance
Inductance ($e=L(di/dt)$)	Continuance	Inductance ($e=L(di/dt)$)	Normative	Inductance ($e=L(di/dt)$)	Affective

3.2 Procedure

The study attempts collecting OC's longitudinal data from employees by conducting several rounds of self-completion questionnaire together with semi structured interviews. Then, input the data to the six models respectively. Running the models and select one that is best fit to the real-world situation.

For the triangulating purpose, we will gather expert opinion from human resource and electronic engineering fields. Two types of data, which can be listed as interview and card sorting exercise, will be gathered from the experts. Discourse analysis is the technique that is for decoding the qualitative data from interviews. The outcomes of discourse analysis will put together with the results of card sorting exercise, to verify the linguistic link of boost converter elements and OC factors of the best fitting model.

4. Summary

This conceptual paper discussed the possibility of applying boost converter model into human resource context and simulating employee's turnover action. The paper further more explained the proposed procedure of doing so.

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