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System Dynamic Analysis Implementation in Risk Management of Labour Social Security Membership Policy

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Abstract:

One of the challenges in overseeing an implementation of a policy is to foresee the risks that may arise with it. One may identify any risks without knowing the correlation among each element within them. This would commonly lead to a more tangled future policy making due to undesired archetypes occurrence. BPJS Ketenagakerjaan recently applied a policy to accelerate member acquisitions by adapting the Japanese Sharousi scheme. The Supervisory Board of BPJS Ketenagakerjaan ran a system dynamic model and further analyzed it, in order to capture the whole consequences of the policy implemented. Analyses of the model were elaborated in this paper. The analyses cover the correlating risk elements of the policy model. How each of them interact and influence one to another. Some simulation results were also presented. Furthermore, recommendations were made based upon the analyses.

Keywords: *Modelling Analysis, Policy, Risk Management, System Thinking.*

I. INTRODUCTION

The Japanese *Sharousi system*[1]has been considered to be an ironclad and proven scheme for social security membership expansion. The scheme distinct feature is by developing top level – highly qualified experts to serve the necessary means with member's labour social security issues. Despite its success in having a prominent performance, it is yet to implement a fully digitalized system, and hence most of the administration and business process is done manually. One of the reason of its reluctances for pursuing a total digital implementation is the lack of control on risks. The *Sharousi* Federation claims that digitalization leads to a speed up process, which would accelerate services. However, this also leads to a more complex risk management.

The Indonesian Labour Social Security Agency, *BPJS Ketenagakerjaan*, claims that it has adapted the *Sharousi system* above. In addition to the adapted system, it provides wide-range of digital services to trained personnel, called *Perisai*. This additional feature enables the personnel to serve administratively their bound and maintained members for the agency. A few significant risks are then identified in such implementation [2].

The aim of this work is to provide a tool to monitor arising risks of the above implementation through*system dynamic modelling*. Then recommendations to mitigate such risks are then provided.

II. GAP ANALYSIS

The claim that *Perisai* is an adaptation of the *Sharousi system* still leave some gaps to be looked at. The gaps[2] are found to be as follows

A. Law Enforcement

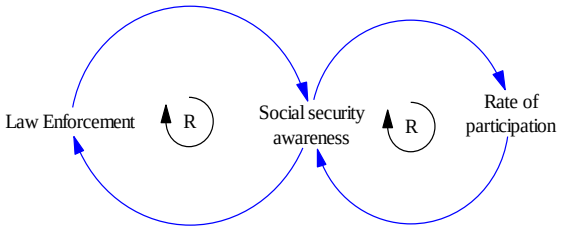

Figure 1
Causal Loop of Law Enforcement

Regulation has been conceived which stipulates that*every company to register all their employees as the agency members*. As stated inIndonesian Law No. 24 Year 2011 regarding Social Security Agencies

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(BPJS), "*an employer must continuously register themselves and their employees as the agency members that conform to their needs"*. If an employer does not comply with the regulation, they shall be sanctioned administratively, and furthermore shall not be eligible for any government services. However, such sanctions are still considered to be ineffective. This opens some niche for employers' disobediences. The same regulation is also imposed for the non-formal workers which are *Perisai*'s responsibility.

As pointed out by Weaver [3], people tend to obey regulation if they realize there are sufficient perceived incentives for compliance. The Law No. 24 Year 2011 leaves the punishment to be underestimated, due to its minimalistic nature of consequence. Though a specific fine may apply as stated in the Law, its application is never swift and direct.

The relationship of the law enforcement, social security awareness and rate of participation is best presented in Figure 1.

B. *Ineffective Communications*

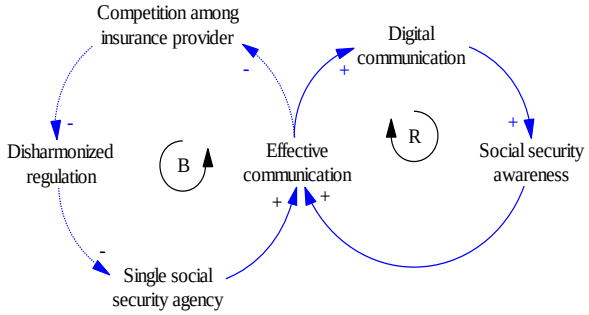

Figure 2
Causal Loop Diagram of effective communication, disharmonized regulation, and social security awareness

In order to create a true learning organization[4], the Agency needs to have effective *vertical* and *horizontal* communications. Policy risks may normally be mitigated by an effective horizontal communications. Horizontal miscommunication may lead to aregulation disharmony. The agency claims that one of the challenges in increasing active participant number is the lack of coordination among ministries/institutions to synchronize policies.Some still perceive that social security is not compulsory [5]. Evidence of disharmonious regulation can be seen in overlapping protection policies among the Ministry of Agriculture, Ministry of Marine Affairs and Fishery, and The agency. Those Ministries partner*Jasindo*,a state-owned enterprise, toinsure farmers and fishers that cover drought, flood, and accident relatedprotections [6].

On the other hand, vertical miscommunications may lead to public misperceptions. A significant number of people are found to be unable to distinguish between social security and commercial insurance. This also leads to public unawareness which obviously does not favour the agency member acquisition program.

Such communication ineffectiveness and regulation disharmony abovesubtract social security awareness optimality. Their relationships are best presented as a causal loop diagram in Figure 2.

C. *Perisai Agent Qualifications*

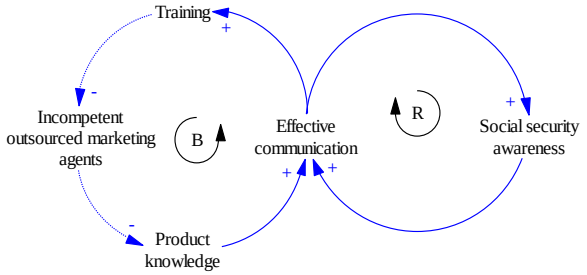

Figure 3
Causal Loop Diagram of incompetent outsourced marketing agents, effective communication, and social security awareness

The fourth rule of teneconomic principles conceived by Mankiw[7] stated that people would respond to incentive. Policymaker must remember about incentives. Policy change shall affect people point of view on cost, benefit and behaviour. Should policymakers fail to address the incentives issue, they would find themselves in the endpoint differed from their initial intentions.

*Perisai*agents are recruited and trained by the agency. The recruitment source mostly comes from independent insurance agent community. It is a pity that the training procedure has not been standardized. The training period is too swift. It still prioritizes the quantitative results rather than pursuing the quality.

Perisai incentives consist of acquisition and contribution fees. This incentive is regulated in the Decree of The Agency Director No. Kep/260/112017. *Perisai* agents shall receive an amount of IDR 500 thousand, each of the following month everytime 50 new participants acquired. This is not accumulative. Additionaly, the agents shall receive 7.5% of the total contribution. Acquisition and contribution fees are paid within a composition

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ratio of 10% to the *Perisai* Office and 90% to the *Perisai* agent. *Perisai* agents may be deactivated if they are unsuccessfulin acquiring a new memberand fail to pay the premium for three consecutive months. Termination is done automatically through the *Perisai* information system.

Perisai agents are only allowed to acquire new participants from small-micro business sectors and self-employed. The micro and small-scale business is defined as the company with a maximum premium contribution of IDR 7 million per month. In case of exceeding IDR 7 Million premium monthly, the participants handling shall be transferred to The Labour Social Security Agency. Such conditions do not give much incentives to *Perisai*agent. This results in a drawback in recruiting highly-qualified *Perisai* personnel.

The *Perisai*targetedlevel of business sector is well known to besubstantially challenging for member acquisition. Not only lack of social security awareness, the labour forces in this sector are well known to be *underpaid*. Even though the labour law states that all workers must be protected by social security, their income structures are far from ideal to cover the cost.In dilemma, this group of work force is the most prone to lack of social protection.The lack of awareness situation within this group needs to be continuously educated and socialized.

Figure 3 shows the overall situation in a causal loop diagram.

The 3 gaps discussed above only cover the Indonesian side of the implementation. It should be apparent enough that the Japanese side has the upper-hand in terms of situation and condition. Hence it shall not be further discussed in detail.

The above gaps are the evidence that the *Perisai* scheme is merely an adaptation of the *Sharousi system*. The different national conditions of the two countries play a huge role in the differentiations.

III. Sensors

Any systems may be monitoredby applying certain conditions to the system itself that produce feedbacks. Feedbacks can be looked at by applying sensors to the element of concerns.

The concern of this work relies upon the implementation of Risk Management. Hence, any arising risks can be identified and controlled accordingly to mitigate.

The use of different kind of sensors for risk management implementations have been applied in reality. One may use for a very sensitive and crucial case [8]. Another one may utilize it for a data driven issue [9].

The system dynamic model conceived in this work is not designed to run nor suggest a mitigation process automatically. However the applied sensors to the model shall enable analysis to be done quantitatively and qualitatively. Such approach may be considered to give sufficient information for a further decision making stage.

The type of sensors used are based on risk profile identified. By utilizing certain risk thresholds, a benchmarking scenarios may be analyzed. However, depending upon the risk appetite and tolerance determined by the decision makers, corresponding actions may then be applied for a mitigation process to take place.

IV. Risk Management

It should be straightforwardly spotted that the risk to deal with in the policy made in **INTRODUCTION** to be in medium to high category. The gaps identified in **Gap Analysis** confirm that category range. This situation makes the Risk Management work to be substantially challenging and complex.

The combined situation presented in Figure 4 shows a dynamic system which emphasizes the importance of the *social security awareness* in correlation to improve the *rate of participation*. Even though the model already consists of *risk mitigating elements,* such as *effective communication* and *law enforcement*, it still needs to be treated accordingly for further risk mitigations. Therefore, a more comprehensive model needs to be conceived to involve a holistic risk management.

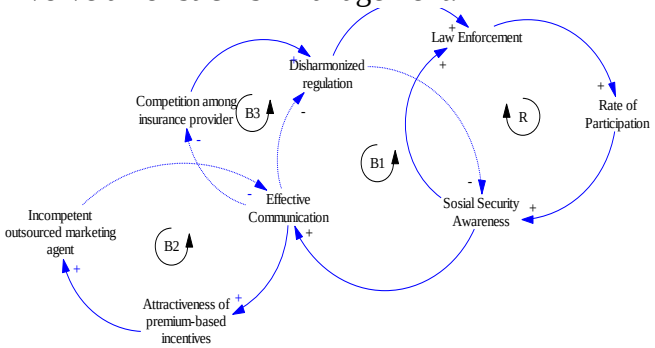

Figure 4
Causal Loop Diagram of a lower rate of labor social security participation

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V. Model

A. Assumptions

Assumptions used in this work, are all related toauthorities given to the agency based on the Law of The Republic of IndonesiaNo. 24 Year 2011 regarding Social Security Agencies (BPJS). The scope beyond such authorities shall not be included into the model conceived. However, the model is designed to be as broad as possible to cover all corresponding detailed dynamics.

Risk profile of the agency as a whole organization is found to be in the intermediate level of maturity. Hence the assumption related to the agency profile shall be considered to incur *mediumlevelrisk*.

Risk appetite of the management is never determined by the management. Hence the assumption used shall be in the *medium level of risk appetite* as well.

B. Boundary Conditions

The boundary conditions applied to the model is based upon the relevant elements limited by the *Assumptions* above.

All qualitative elements shall be quantified using a scoring mechanism.

C. Parameters

The importance of the *social security awareness* shall be the key element of the model. This element is believed to be instrumental to achieve the desired *member participation* level. Analysis is intensively done to simulate the best scenario to achieve optimality of this element.

Risks and other relevant conditions are also analyzed for further recommendations.

The scoring mechanism applied to analyze qualitative elements ranges from 1 to 10, from the smallest scale to the highest scale of each qualitative element.This approach is also applied to analyze risks within the system model.

Important risks to be looked at are as follows:

1. low *social security awareness*,
2. high *acquisition cost*,
3. high *incompliances*,
4. low *member participation* level,
5. low *service delivery* level,
6. andpossibly other known *external risks*.

Different risk thresholds shall be applied as sensors depending upon the corresponding risk appetites of the management and organization risk profile.

D. Complete Model

The causal loop in Figure 4 is used as the base model. It is thenexpanded to include sensors for capturing the dynamic of the risks within the system. The complexity of the new system has now become more significant and best represented in Figure 5.

The sensors implemented shall be used to analyze the five important risks mentioned above. The external risks shall be analyzed separately.

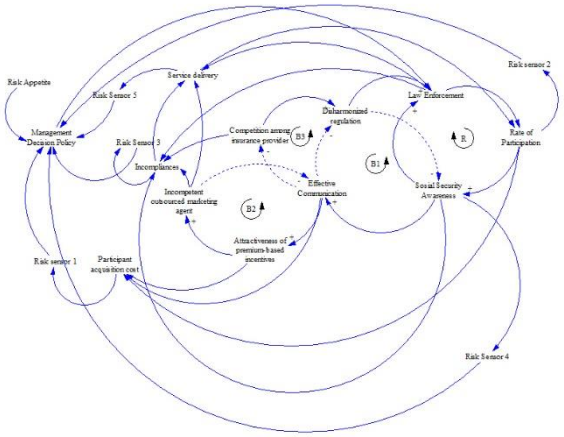

Figure 5
Causal Loop Diagram of The new system where risk sensors applied

The complete model itself in a *VENSIM*(Garcia [12]) model format is presented in Figure 6. Most of the elements involved are in the form of *level* (*stock and flow*). The model is designed to mimic the behavior of the real system with boundary conditions applied. The simulation of the model is then run for 3 *risk appetite* cases, i.e. *low risk appetite*(score 3), *medium risk appetite*(score 5), and *high risk appetite*(score 7). These different risk appetite cases are input as constant variable in the form of *risk appetite* element, shown in Figure 6. The simulations are run with the time step of 100 months period.

Risk appetite is set to be 3, 5 and 7 according to *low*, *medium* and *highrisk appetite* conditions.

Risk sensors are numbered accordingly to the *important risks* to be observed as mentioned above.

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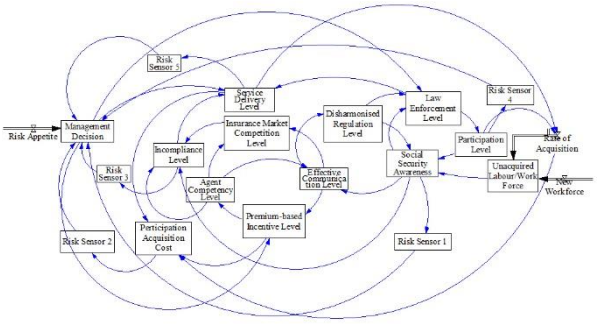

Figure 6
The VENSIM model of the system

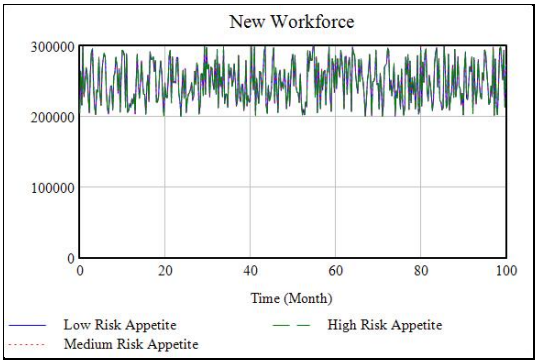

Figure 7
New Workforce

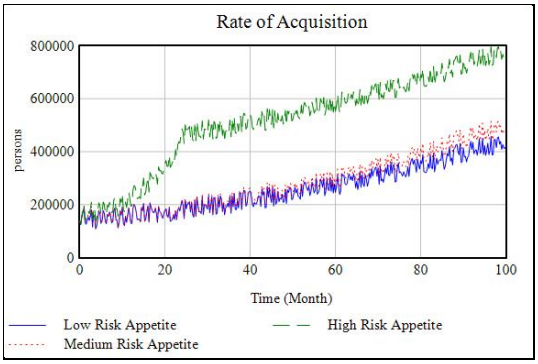

Figure 8
Rate of Acquisition

The driving elements are *new workforce* and *rate of acquisition*. They are randomized using *Random Normal Function* within *VENSIM* as shown in Figure 7 and Figure 8. Such condition is applied to simulate the real situation. The *rate of acquisition* element (Figure 8) becomes a dynamic value, since it has a causal relation with *participation level* and hence influenced by it.

VI. Simulation Results

Each important risk within the new system is observed dynamically.Their sensor outputs shall be used as inputs to the *management decision*element.The *management decision* element becomes the aggregate of all the sensor outputs. It has captured all the risk information in the system. It can then be used further to simulate the management intervention.

The logic of the *mental model* [4] of the system can be analyzed as shown in Figure 9, Figure 10, Figure 11 and Figure 12.

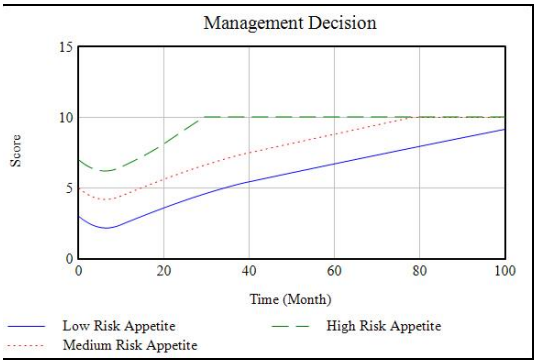

Figure 9
Management Decision

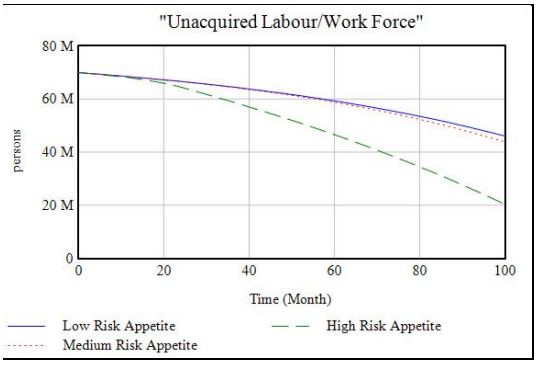

Figure 10
UnacquiredLabour/Work Force

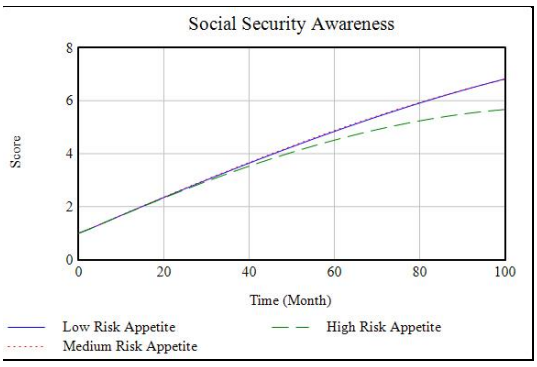

Figure 11
Social Security Awareness

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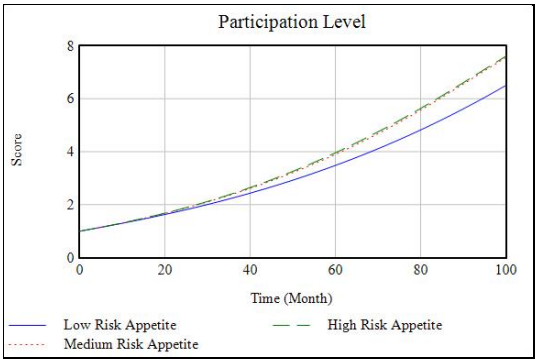

Figure 12
Participation Level

The management intervention needs to be introduced by point of reference in a form of *risk threshold*. There are not many references related to *risk threshold*. However, it can trivially defined as *the allowable limit of risk to be taken*. Hence, any risks above the allowable level must be mitigated or intervened.

The introduction of the *risk threshold* results in a modified model as shown inFigure 13. The *risk threshold* is constantly set to 5, to represent medium type of risk level. Consequently, the corresponding *management decision* (Figure 14), *unacquiredlabour/work force* (Figure 15), *social security awareness* (Figure 16) and *participation level* (Figure 17) are presented below.

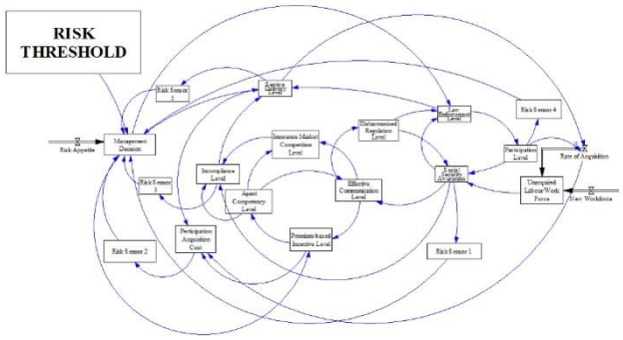

Figure 13
VENSIM Model with Risk Threshold Introduction

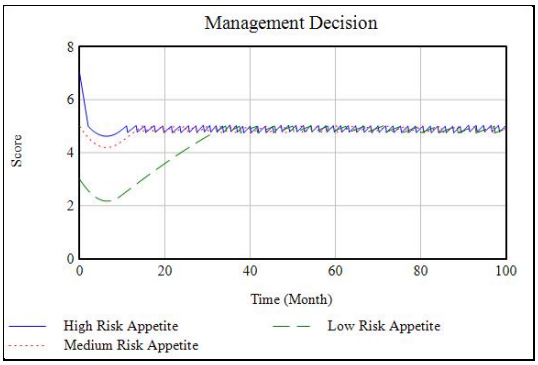

Figure 14
Management Decision with Risk Threshold applied

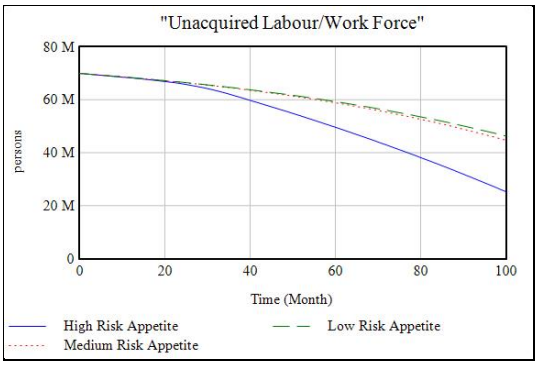

Figure 15
UnacquiredLabour/Work Force with Risk Threshold applied

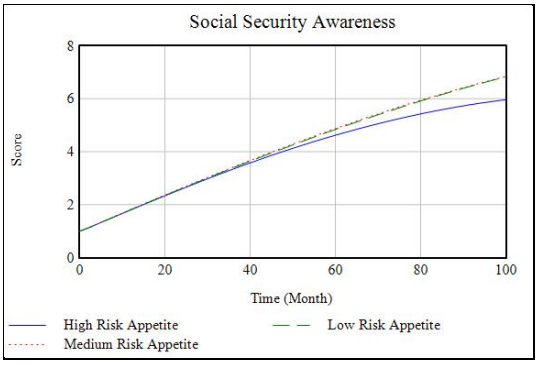

Figure 16
Social Security Awareness with Risk Threshold applied

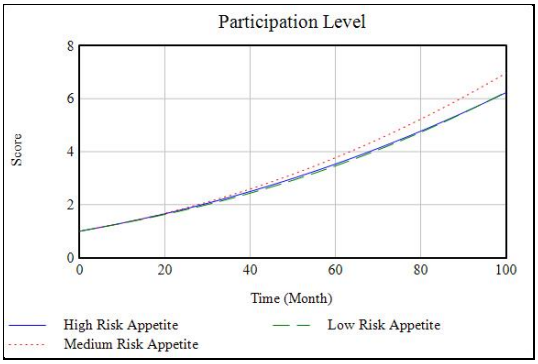

Figure 17
Participation Level with Risk Threshold applied

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VII. DISCUSSIONS

Prior to *risk threshold* application, the model tends to generate high level of risk at*management decision*. Even though the trend is descending at the early stage, then it goes up in the later stage and reaches the highest level of risk (Figure 9). The higher *risk appetite*, the quicker it reaches the highest level of risk. This is plausibly acceptable since aggressive *management decision* shall accumulatively add up to risk level. However, reaching the highest level of risk is undesirable.

The *unacquiredlabour/work force* element tends to descend (Figure 10). The higher *risk appetite* results in steeper descend slope. This situation is also expected, the more aggressive the management is the acquisition process should do as is.

The *social security awareness* element tends to increase (Figure 11). However with high *risk appetite*the increasing slope is less. This be can interpreted as the more aggressive the management to socialize, it results in more negligenceoccurring. Hence the effectiveness of the socialization is reduced.

The *participation level* elementalso tends to increase (Figure 12). The higher the *risk appetite* the steeper the slope of the curve. *High risk appetite* responds well to the participation level, although the slope performance is merely the same to the *medium risk appetite*.

The introduction of the *risk threshold* pushes the *management decision* to adjust so the risk taken is not higher than the determined *risk threshold* (Figure 14). It mimics the behavior where the management intervenes as such to keep it the risk levelled or even below the threshold.

Even though there are insignificant deviation to *unacquiredlabour/work force* and *social security awareness* elements, their behavior remain similar to the pre-threshold introduction (Figure 15 and Figure 16).

Phenomenally, the *participation level* element responds best to medium risk appetite as shown in Figure 17. This shows that the effect of high *risk appetite* to the *participation level* is mitigated by the intervention of the *management decision*.

VIII. RECOMMENDATIONS

The system dynamic model presented can be acceptably useful to identify risk behavior that may arise within the system. It can be expanded to include other known *external risks.* However, to cover the scope of this journal, the model is considered to be satisfactory. Future work may include other known *external risks.*

CONCLUSION

The model presented shows that undesired archetype can be avoided. The intervention of management scenarioplays a very important role to keep all the relevant risks manageable.

Despite significant gap to the *Sharousi* system identified, the *Perisai* system can be used to boost the membership acquisition process, should all the risks within it are managed.

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