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MISSING ASPECTS OF THE RISK: SPEED AND DURATION

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ABSTRACT

Purpose- Risk assessment, risk prioritization and risk responding are vital steps in any risk management process. After risks are identified, traditional approach allows risk experts to define likelihood and impact factors for these risks. Thus, a risk severity can be defined, and risk prioritization can be considered under the budget constraints, i.e., cost of implementing remedial measures. On the other hand, recent events, like digitalization and pandemic, showed that evaluating only these two factors of the risk can be missing. Two important aspects of the risk are suggested to be considered: speed (velocity) and duration. In this study, these two elements are analyzed.
Methodology- In the study, following an introduction, COSO models and results of the literature review are analyzed. After a theoretical background and a literature review, a discussion on new aspects of the risk is started. Finally, an imaginary case is used to analyze risks including all aspects.
Findings- It is realized that in the academic literature, new aspects of the risk have not been addressed yet. This is the reason why these two aspects defined as missing. At the end, it is concluded that although speed and duration are elements, which directly affect the impact factors, at the same time, these are key determinants of the timing and structure of the risk responses. Additionally, continuous risk assessment can be beneficial for the entities to have more time to respond to the risks.
Conclusion- Depending on the findings, it is concluded that all aspects of the risk is needed to be analyzed during risk management processes. The originality of this study stems from the fact that it includes practical suggestions for integrating the concepts of speed and velocity, which are conceptually included into the frameworks. In addition, this study presents a perspective by associating the concepts of agility, resilience, and continuous risk assessment.

Keywords: Risk assessment, COSO, risk management, internal control, internal audit.
JEL Codes: G32, M42, M19

1. INTRODUCTION

The entities, while performing in a changing environment, face with some opportunities and threats. Since internal and external environment in which they operate are subject to a continuous change, these opportunities and threats can also potentially change. When the speed of this change somehow increases, predictability of the environment for the entities decreases. By nature, entities have some objectives in strategic and tactical levels and any factors, which have potentially adverse effects in achieving objectives, are called as risk.

Entities, in order to achieve their objectives, need proper actions and defining them highly depends on risk identification and risk assessment. Thus, identifying risks and assessing their potential effects are vital parts of the risk management process.

The most common criteria used in defining risks is the product of likelihood and impact levels. By estimating the potential consequences of the risk, risk experts try to analyze the needs for actions to achieve organizational objectives. Latest developments in risk management suggest that some other aspects can be used to define risk levels and actions to be designed.

The first part of this study aims to define these new aspects, which have been generally omitting in risk definition processes. In defining the new concept, a widely used framework, COSO, is preferred. After a literature review, a practical example is

proposed to integrate these new aspects into the processes. The study aims to connect these risk aspects with other newly defined concepts: agility, resilience, and continuous risk management.

First section defines the concepts. During the first sub-section under this first part, all elements of the risk are evaluated by considering a generally accepted framework, COSO. Second sub-section defines increasing importance of the elements which had been rarely addressed before Covid-19 pandemic. After this discussion, a literature review is performed to analyze how much other aspects of the risk, i.e., speed and duration, are used in academic studies. Last section is presented in two sub-sections. In the first one, a theoretical discussion is performed on the results of the COSO framework. Considering the results of this sub-section, an imaginary case is discussed to analyze all elements of the risk. Last part summarizes the conclusions.

2. MISSING ASPECTS: SPEED AND DURATION OF THE RISK

First part of the section summarizes COSO's speed and duration definition in its different versions. Second part explains increasing importance of the aspects, especially after the Covid pandemic.

2.1. Definition of Speed and Duration in COSO Framework

According to the Internal Control – Integrated Framework, which is published by the Committee of Sponsoring Organizations of the Treadway Commission, or with its very well-known name, COSO, determination of the significance level of the risks is an important part of the internal control framework. Assessing the significance of risk is an internal step in risk assessment process, just comes after the defining organizational objectives and identifying the risks. Since the latter step in internal control is deciding the proper response for the risks and the risk assessment step is a prerequisite for the latter one, together with the risk identification, defining the significance level for the risks is crucial to respond the risks.

The criteria used in the COSO model for defining the significance level of the risks are:

- Likelihood (or in another definition, probability)
- Impact, which is another very well-known criteria with the likelihood
- Speed (or velocity) of the risk (showing how contagious the risk is.), and finally,
- Duration of the impact, showing how persistence the risk is (COSO, 2013).

Both likelihood and impact are the common dimensions of the risk that have been using in risk assessment in practice. Multiplication of these two factors represents the riskiness level. The result gathering from this multiplication gives that a level of effect (impact) can be observed with a level of possibility (likelihood). If the likelihood can be represented as a percentage, it is generally called as probability (COSO, 2013).

In its full text, COSO defines the speed as the changes in the environment and the conditions. Probability of failing in managing the adaptability to the speed can be named as speed of the risk. The example given in the COSO document for the speed of risk is manufacturer's fail in adapting to the speed experienced in changes seen in customer preferences and regulatory environment (COSO, 2013). On the other hand, duration represents how long a risk can persist.

COSO, during its pages related with risk assessment, explains that the entities should consider the risk tolerance (COSO, 2013). But the actual level of the risk can be underestimated when these two aspects of the risk are not considered.

It is surprising to see that the COSO document, in its part in which risk assessment is explained, first defined these two aspects but during the rest of the document these aspects are not re-emphasized. In its previous version, Internal Control – Integrated Framework, issued in 1994, COSO considers only the first two aspects, significance and likelihood. The only thing that the initial version of COSO emphasized is that changing environment may need more attention during the risk assessment processes (COSO, 1994).

Another document, COSO Enterprise Risk Management: Integrating with Strategy and Performance, published in 2017, added new aspects to the risk. According to this document,

- adaptability,
- complexity,
- velocity,
- persistence, and
- recovery

should be taken into consideration in prioritizing risks (COSO, 2017). After an evaluation made on the risk, risk severity, i.e., combination of likelihood and impact, can be defined to be compared with the risk appetite. This latest version of COSO clearly states that a risk with higher speed or duration needs to be prioritized comparing with another risk with lower speed

or duration, even if both risks are considered equal in severity. Thus, in responding risks, both severity of the risk, and priority, i.e., comparative evaluation in velocity and persistence, should be considered (COSO, 2017). Therefore, risk responses can be determined by considering risk appetite, risk severity, risk prioritization, costs and benefits of risk responses, obligations and expectations and business context (COSO, 2017). A very common illustration for risk severity, a heat map, can be found in Figure 1.

Figure 1: Risk Severity in Heat Map

Source: COSO (2017)

Previous version of the COSO ERM model, Enterprise Risk Management – Integrated Framework, published in 2004, does not contain aspects of the risks other than likelihood and impact. In this model, although speed of responses is not commented, time horizon for risk assessment is defined as both short to mid-term and long term (COSO, 2004).

Considering different COSO versions, it is quite normal to conclude that although likelihood and impact are traditional elements in risk assessment, other aspects of the risk, velocity, and duration, are relatively new. After 2013, these aspects are started to be integrated into the models but in 2013 version, it could not be defined how these elements can be used in risk responses. Fortunately, 2017 version of COSO made it practically usable.

2.2. Increasing Needs for Defining Speed and Duration

Before 2019, the year in which earlier effects of the Covid pandemic is appeared, the major reason for dealing with the speed of risk was only the digitalization and there is no such a necessary reason to deal with duration of risk. In any consideration regarding speed of risk, digitalization has been evaluating as a factor that increase contagion of the risk. Customer dissatisfaction or any change in entities' reputation can be distributed rapidly as a result of increasing integration among the agents in the economy after digital transformation.

An additional and powerful effect is observed in the present day. Before it is realized at the end of 2019, the pandemic had been defining as an incident with low probability and medium effect, since the experience in pandemic had been indicating that this incidence can be only a regional case. However, Covid pandemic showed that any pandemic can have more effect than expected since its speed and duration can be more than estimated. Within a very short period, i.e., in months, the Covid pandemic spread over the earth and it has been standing for more than two years while this article has been writing. It becomes the root cause of the new economic situation over its side effects, i.e., decrease in economic activity due to the lockdowns, deterioration in the supply chain, increase in energy prices, and, finally, the inflation. If the velocity of the pandemic risk was insignificant, probably, it could be ended as a regional case with some limited effects. Similarly, if its effects were limited within only couple of months, means that the duration was limited, the consequences of the pandemic could be also minor comparing the current situation. Shorter period in risk exposure could be resulted with a quick recovery instead of deeper consequences.

Please consider the pre-pandemic era. How can you evaluate possibility of a pandemic case in your country? Perhaps, the answer will be 'very rare' since the historical information about the pandemic cases says that likelihood is very low. How can you evaluate the impact expected from a pandemic case? The most common answer will be probably low. But at the early stages of the pandemic, let say during March 2020, a limited information on what we faced with was known. Most of the risk experts failed to realize the speed of risk and to assess how the pandemic was contagious. Unfortunately, in a very short time, the virus spread to the different geographical areas and its speed was unreachably fast.

Now please consider that you are a risk expert in Europe, and you have been trying to analyze potential outcomes of a newly defined pandemic case in China to your businesses. The impact is unforeseeable since the duration of the pandemic has not been known yet. Thus, the risk responses cannot be easily determined unknowing if some long-term actions are needed

against the risk. It may be an early stage to design some costly long-term mitigating actions or defining some short-term precautions against the risk may be costly if additional controls need to be designed as risk remains.

Once the risk level is determined, a proper action should be defined against the risk. Generally, there is a weak basis to take actions against the low-impact and low-probability risks. This is called as risk acceptance. For other risks, it can be needed to be more active. In deciding the response, the cost of the remedial actions and the benefit against this cost should be evaluated. If the cost of mitigating the risk is much higher than the potential benefit, it can be decided to stop the activity. Otherwise, an action should be determined against the risk. This action can mitigate the risk by increasing control effectiveness or share it with another party accepting a transferring cost (COSO, 2017).

Even if the speed and the duration of the risk can be considered as the determinants of the impact of risk, each of them, by itself, continues to present some valuable information on the nature of the risks. The value of these two indicators comes from their effects on risk responses. It is quite normal to expect more agile responses against the risks with high level of speed and more long-term responses against the risks with high level of duration. Thus, the selection of the responses or the design of the controls, including the cost of controls, depends on speed and duration of the risk and defining the proper design is crucial to handle the risks.

Adding these two missing aspects to the risk assessment procedures can create some benefits for risk practitioners. Potential benefits are:

- Aligning with the speed of risk in responding it.
- Deciding on risk responses considering the time length needed to implement necessary actions.

Since the speed of risk can vary in time, risk experts can consider analyzing how quick a response needed to be generated against the risks. Especially for the risks with high severity, the action plans can be needed to be more agile to prevent adverse effects of the risks. Agility can be considered as an ability to adopt in changing environment and against newly appearing risks. Organizational agility needs increased awareness of changing environment. Thus, entities operating in high-speed changing environments need to monitor what is happening internally and externally. In other words, in traditional approach, although risk assessment is thought as an annual activity, it becomes a continuous process for these entities. Together with the shortening action periods, it results with more timely responses in risk management.

These were the potential roles of the first and second lines performing in the entities. On the other hand, another line, internal audit also needs to be more aligned with the organizational agility. Agility in internal audit can be achieved by continuous monitoring and risk assessment which are resulted with a dynamic audit plan, eliminating non-audit tasks with a lean approach focusing on the audit's real value, increasing the timeliness of reporting by continuous/immediate risk reporting and offering remedial actions aligned with speed of risk (Baloğlu, 2019).

Second benefit from adding new aspects of the risk is ability to decide on the responses considering the length of the time period in which the risk expected to continue. Thus, a response, let say a new control, can be designed only after realizing the period that the entity is expected to suffer from the risk and regarding costs of the implemented control. When a risk realized, if its effects last for a period longer than expected, the entity can be heavily damaged by the risk event. On the other hand, if the effects last for a shorter period than entity expected, risk response can be more costly than what is really needed.

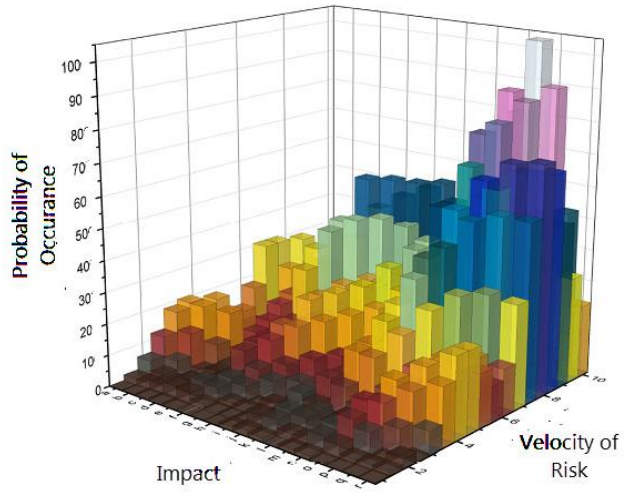
3. A LITERATURE REVIEW: HOW HAVE THESE ASPECTS BEEN MISSED?

In literature review, very limited number of studies related with these other aspects of the risk are found, while most of them cannot be defined as academic study considering their structure or scope.

Ramamoorti et.al (2019), in their study, emphasizes on that during the crisis, identifying and managing risks become an urgent issue. The researchers' claims that especially social media and internet allow fast exposures in the times of crises. In their consideration, time lag between a risk-driven crisis and decline in reputation of an entity is almost disappeared. Thus, velocity of risk become an important issue that should be taken into consideration by risk experts and internal auditors. The study concludes that, by adding velocity of risk, risk assessment becomes a three-dimensional practice, considering the existing traditional dimensions, likelihood and impact.

Nichols (2016), in his article published in LinkedIn, defines risk velocity as the time between when the first risk appears (which is also known as onset of risk) and when impacts are observed. It also visualizes three-dimensional risk map as illustrated in Figure 2, which is seen revolutionary comparing two-dimensional map presented in Figure 1.

Figure 2: Three-Dimensional Risk Map



Source: Nichols (2016)

Osundahunsi (2012), in his presentation, proposes a two-dimensional risk matrix with dimensions of risk severity, i.e., likelihood and impact, and risk velocity. Thus, he finds a usable heat matrix which considers both risk levels and response speeds required. This alternative in inserting risk velocity into risk assessment seems more aligned with COSO's approach comparing with three-dimensional matrix. Two-dimensional alternative is shown in Figure 3. The values in matrix are found by dividing risk severity to risk velocity.

Figure 3: Two-Dimensional Risk Map with Risk Velocity

RISK VELOCITY (DAYS)	1	6	12	18	24	36	72
120	0.01	0.05	0.10	0.15	0.20	0.30	0.60
90	0.01	0.07	0.13	0.20	0.27	0.40	0.80
75	0.01	0.07	0.13	0.20	0.27	0.40	0.80
60	0.02	0.10	0.20	0.30	0.40	0.60	1.20
45	0.02	0.13	0.27	0.40	0.53	0.80	1.60
30	0.03	0.20	0.40	0.60	0.80	1.20	2.40
15	0.07	0.40	0.80	1.20	1.60	2.40	4.80

PROBABILITY X IMPACT PROFILE

Source: Osundahunsi (2012)

Hall (n/a), in his blog page, defines risk velocity as the time to impact. In his study, a 5-scale assessment is suggested to define velocity level and velocity is presented as an element which will be added to the probability before multiplying with the impact to find the risk score. So, the formula suggested is that Risk Score = Impact x (Probability + Velocity), which is quite different than what COSO stated.

Deloitte (2011), in its document, focuses on the term risk intelligence and, among others, lists 'risk velocity understanding' as an essential skill for a sound risk awareness. According to Deloitte, speed of risk response should be aligned with speed of risk onset.

Davis and Lukomnik (2009), in their article, state that when an entity faces with a newly emerging risk at the first time, a trade-off needs to be solved: understanding all details regarding the risk or responding as earlier as before the entity is affected. The article defines agility as the ratio calculated by dividing speed of response to risk velocity.

In academic literature, recent studies are reviewed, and it is observed that risk assessment methodologies used in these studies exclude speed and duration of risk. Although a number of the similar studies can be listed, some most remarkable ones from different application areas can be reported: Pascarella et.al (2021) performed a risk analysis in healthcare organizations and used only traditional aspects of the risk to make prioritization. In this study, 5-scale likelihood and impact scores are used both qualitatively and quantitatively. Palin et.al (2021), in its research on impacts of extreme weather on rail infrastructure, used a risk model in which only likelihood and impact factors are considered. Harrington et.al (2021) applies only likelihood and impact factors to decide on risks for pre-pandemic influenza strains. Rana and Pitroda (2021), in its study, emphasizes on only traditional aspects of the risk, while examining risk analysis and mitigation techniques used in Indian transportation industries. Amini and Jamil (2018), in its review study on risk assessment models in cloud computing, indicated that one of the models generally accepted, SEBCRA, uses likelihood and impact factors to prioritize the risks. Manthrirathna, Rajini and Gowsiga (2019) uses only two traditional dimensions of the risk in analyzing Sri Lankan apparel manufacturing organizations' riskiness level. As it can be seen from the literature view, elements of the risk other than likelihood and impact are missing in the studies.

During the literature review, it is seen that the number of studies on two aspects of the risk is quite low and it is not possible to find any study on the duration of the risk. This is why we called these two dimensions as missed.

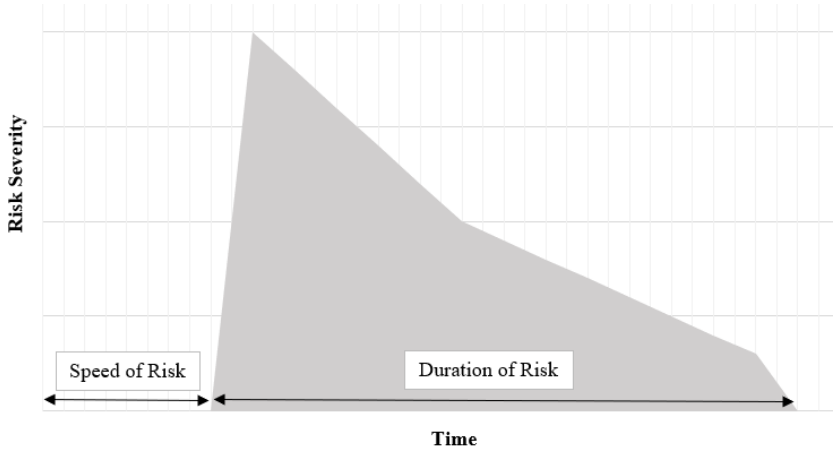
4. DISCUSSIONS

In this section, after a theoretical discussion, an imaginary case will be analyzed. In the first part, speed and duration contexts will be explained on the time-axis. All related definitions will be done in this part. Following this theoretical discussion, in the second part, an imaginary case will be presented to explain how all aspects of the risk can be considered during risk assessments.

4.1. Revisiting the Speed and Duration of the Risk

Considering COSO's theoretical framework and literature review results summarized above, it is thought that two aspects of the risk can be illustrated as Figure 4. This figure has an importance to determine risk responses.

Figure 4: Risk Velocity and Risk Duration



According to Figure 4, speed, or velocity, of risk can be considered as a period before risk exposure starts. The origin of the x-y presentation represents onset of risk and the starting point of risk severity on y axis represents the instant when the entity started to be affected by the risk. If this period is short, it is thought that the speed of risk is high, and that the entity may not have enough time to respond against the risk. If this period is long, speed of risk is low and the entity does not have to respond as urgent as in the case where the speed is high.

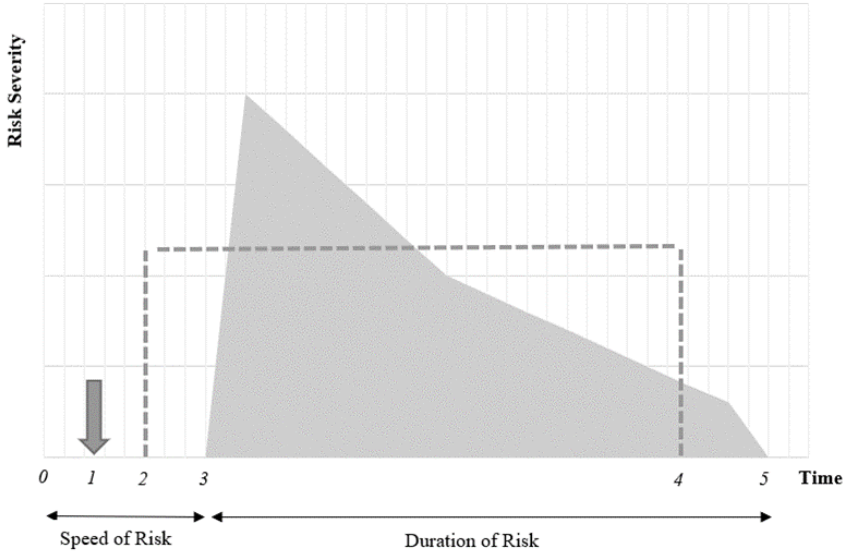
Second point that can be concluded from Figure 4 is related with the duration. Duration is the period starting from the first instant when the entity faces with the risk and ending with the last instant when suffered from it. If the duration is long, total risk impact is expected to be high. If the duration is short, total risk impact for the same risk can be low comparatively. The shape of the severity curve determines how the entity will be affected by a risk. Some risks may be harmful in earlier periods of their duration and as time passes, the adverse effects decrease. Some others stay constant during their durations.

Remaining may become more harmful as time passes. In Figure 4, we used an illustration which represents the first case. The shape of the curve is closely related with the duration.

One important distinction should be noted. Although speed is defined as the period starting at an instant when the risk is first realized and ending with an instant the risk is first affected the entity, timely recognition of the risk is crucial since earlier risk awareness can allow more time to respond. Thus, the instant first the risk is arisen can be a different instant than when first the risk is recognized. This increases the importance of the continuous risk assessment which requires awareness on internal and external environment instantly. Note that, only early recognition of the risk may not be enough for timely responding since implementation of the remedial actions may take some time depending on their structure. Thus, agility and continuous risk assessment are extremely close concepts.

In Figure 5, lifecycle of a risk is illustrated.

Figure 5: Lifecycle of a Risk and Response



As discussed before, on time axis, the point represented with '0' is the instant when the risk first appeared. The point '1' represents the instant when the entity first recognized the risk. The risk starts to affect the entity at point '3' and this effect lasts until the point '5' by decreasing in time. An instant representing with '2' shows the implementation of remedial action and this action lasts until the point '4'. Dotted area shows the response in a remediation form. Thus, the grey area within the dotted area represents control effectiveness, while white area in the dotted rectangular shows the over-control. Minimizing this white area inside the dotted rectangular is an issue of cost optimization in designing remedial actions. The grey area outside the rectangular represents the risk that cannot be eliminated by the entity. The figure can be used to have some conclusions: First, as '1' approaches to '0', an entity can find a longer period to response the risk. Thus, any company needs to find ways to identify risks earlier. Continuous risk assessment is an effective way for timely recognition. Second, as '2' is getting closer to '1', this means that the response of the entity is implemented in a more agile way. Third, if the white area inside the dotted rectangular gets smaller, optimization of the cost of remediation is satisfied. Fourth, as the grey area inside the dotted rectangular is getting bigger, control effectiveness increases. The shape and magnitude of the dotted area can be determined by considering both effectiveness and cost of remediation. Fifth, as the grey area outside the dotted rectangular gets smaller, risk exposure, or residual risk level, decreases. Sixth, if the distance between '0' and '3' decreases, speed of risk decreases. Seventh, if the distance between '3' and '5' decreases, duration of the risk decreases. This is related with the resilience concept.

Note that, the analysis is made for a single risk, but entities face with high number of risks simultaneously. Thus, entities should response all risks at the same time under a budget constraint, and this requires performing some trade-offs between the alternative responses. This is exactly what we called as portfolio view and this approach requires prioritization among the risk to define responses optimally.

4.2. Revisiting the Speed and Duration of the Risk

Considering the comments having from Figure 4 and Figure 5, the following exercise can be used to understand all aspects of the risk:

A company operating in tourism sector, let say a hotel, faces with risk of reservation cancellations by the guests from the neighbor country because of a regional turmoil experiencing in this country. This hotel performed a risk analysis before realizing this suddenly arising incidence and rated this risk with low probability and medium impact. Then the risk assessment result depends on traditional risk assessment methodology, which only uses likelihood and impact.

When the hotel first realized the risk, it rapidly switched to a broader approach and decided to consider other aspects of the risk. This time, the hotel needs to revise the existing risk rating after the new information it received and has some other elements to anticipate. The exercise that is needed by the hotel can be performed by using Table.1.

Table 1: An Alternative Risk Assessment Scale

Definition of Risk	Impact	Likelihood	Duration	Speed
Reservation cancellation due to a turmoil in a country	1 to 5	1 to 5	1 to 5	1 to 5

According to the table, all elements of the risk can be rated using a 1-to-5 scale. For example, impact can be depicted as a part of annual net income and the anticipated impact can be rated by using this criterion. For all elements, '1' represent the lowest number and '5' represents the highest value in the scale. While determining the impact level, the hotel will answer some questions like 'how many reservations are subject to cancellation?' and 'what will be the financial effect of these cancellations on annual net income?'. The latest question needs to be answered to rate impact in 1 to 5 scale, but before that annual net income amounts to be used in the scale need to be determined. Let say, the hotel is considering that if 0 to 10% of the annual net income is subject to be lost, then the rate for impact is 1, which is the lowest. If the effect is between 10% and 30%, the impact scale is 2. If it is between 30% and 50%, the scale is 3. If it is between 50% and 100%, the scale is 4. Finally, if it is more than 100%, the scale is 5. Let us imagine that the hotel, in its consideration, decided to choose 3 as an impact level.

Then the likelihood level for impact level needs to be anticipated to find severity of the risk. This is an important step, because risk management is considered as an activity in which a portfolio view is adopted. Portfolio view is an important adoption allowing prioritizing under the cost constraint. Since the resources of the entities are not unlimited and the profitability is vital, remedial actions, e.g., controls, can only be implemented under a cost constraint and if the entity assesses all risks in a portfolio view, in order to operate within its risk appetite, it can determine optimal solutions by prioritizing the risk. Thus, if the hotel is defined the scales that need to be used, let say, as 1-rare, 2-unlikely, 3-possible, 4-occasional, 5-likely, the meaning of this categorization to the hotel can easily be 'repeats once in 20 years cycle', 'repeats once in 10 years cycle', 'repeats once in 5 years cycle', 'repeats once in 2 years' cycle' and 'repeats each and every year' for the likelihood scales respectively. Let us accept that the anticipated level by the hotel for likelihood of the respective risk is 5 after newly received news.

Until this part of the discussion, it will not be wrong to say that the risk assessment procedure is traditional. Now, we will integrate other aspects into our consideration. The third element is duration. In our case, duration is an important element since it also determines the impact. If the hotel is anticipating the turmoil of the country will continue next year, the impact will be almost doubled, if any additional remediation cannot be implemented. Thus, the impact element will be changed by considering the duration. Alternatively, if the hotel expects this incident to be finalized in a very short time, the level of impact will also lower by comparing the first case. Duration is a concept which is highly related with the resilience. If the adverse effects from a risk become continuous, the entity will be less resilient against this risk. Thus, the recovery will be lasted longer. Considering purposes of the study, let us say that duration is expected to be long. Then the impact level will be revised, let say, to 4. Please note that, if the length of intervals determined for the impact scales are identical, then methodologically the rate of impact can be multiplied by the rate of duration to find results that are more comparable in a portfolio view. In our example, we prefer simply to increase impact factor without any calculation.

Besides, duration is not only related with the impact level, but it also determines the response. If the hotel expects that the crisis will be solved in a short time, then the remedial actions will be temporary. For example, the hotel will intent only to revise the capacity budget for the next couple of months while updating some expenditures. If the hotel anticipates that this crisis will last long, the actions against the risk will be probably more permanent, like entering into new markets to increase sales volume. In our case, since the duration is long, the hotel will take some actions to create alternatives for the markets which are expected to exit. Defining proper responses is crucial for both remediating risks and managing costs of actions efficiently.

The last one is speed of risk. As you may remember, speed of risk shows how fast the entity is expected to be affected by the newly arising risk. In our case, the speed is an important determinant. Let us say that the hotel is located in northern hemisphere and operating seasonally, only in summertime, and the turmoil is observed first in May. In this case, the speed will be fast, because the period remaining to start a new season will be short. Thus, the hotel will have a very limited time to respond to a newly arising risk. Contrarily, if the instant when first the turmoil is observed is, let say, in January, then the hotel will still have four months to find a solution against the risk. Thus, the speed will also be one of the determinants of the impact and depending on the instant when risk assessment is performed, impact grade may need to be updated as similar as

what is offered in duration aspect. In our example, let say that the impact is updated to 5 with the combined effect causes from both duration and speed.

Similar to duration, speed also determines the risk response. In our case, if speed is low, the hotel can evaluate to revise its agreements inserting a new statement regarding fines against cancellations. Alternatively, it can consider having an insurance contract to compensate potential revenue losses. When the speed is high, the hotel needs both to react promptly and to find other solutions suitable for eliminating short-term losses as much as the long-term ones. In this case, being agile in risk responding is a key factor to remediate adverse effects of the risk. Thus, the organizational agility should be satisfied. Examples of the suitable actions can be announcing new campaigns for last minute bookings, price discounts for prolonged stays, etc.

The result of the assessment containing all elements of the risk can be depicted under two scenarios as in Table 2.

Table 2: Risk Assessment Results

Definition of Risk	Impact	Likelihood	Severity	Duration	Speed
Scenario 1: Short Duration – Low Speed					
Reservation cancellation due to a turmoil in a country	3	5	15	2	2
Scenario 2: Long Duration – High Speed					
Reservation cancellation due to a turmoil in a country	5	5	25	5	5

Note that if other aspects of the risk are considered, the impact level is increased from 3 to 5 and risk severity is increased to 15 to 25. This is important to compare different risk definitions in severity to prioritize them and to allocate limited resources to respond them. Additionally, the type and timing of the responses will be determined under the consideration of duration and speed. Thus, the responses in two scenarios will be differentiated.

Increasing the level of impact by considering the levels of duration and speed, in our case, can be thought as a simple calculation which have no mathematical ground, so for implementing these effects on impact factor, a formulation can be generated. But note that, if this is the case, the ranges of the ranks that have been using in scales, need to be revisited. The easiest way to implement effects of duration and speed on impact is multiplying these factors. In this case, scales for duration and speed can be redesigned from a 1-to-5 scale approach to, let say, a 0-to-2 scale with narrower ranges. Thus, the risk levels can be calculated by the formula

Riskiness Level = Impact x Duration x Speed x Likelihood

Note that duration and speed become factors of impact level. Let say, in 5-scale grade, severity is calculated as 15. Then, by taking other two aspects into consideration, if we decide that the riskiness level is 30, the duration/speed level jointly doubles the impact level. This representation of the risk will help risk experts to prioritize the risks within a structured scale. But please note that this does not mean that 1-to-5-scale elements are more important than 0-to-2 scale elements. This is only a numerical representation and the reason of taking identical scales for all elements in Table 1 is to prevent this kind of misunderstanding.

5. CONCLUSION

Until COSO defined the risk elements in its updated frameworks, the common usage of the risk assessment had been based on a traditional multiplication: likelihood x impact. However, the experiences gained, especially, from the digitalization and the pandemic showed that some other elements of the risks need to be defined. Besides others, COSO defined two new elements for the risk: speed (velocity) and duration. These new definitions have some advantages in comparing different risks with the same level of severity.

In this study, it is tried to analyze how these new elements can be implemented in practical examples. After using an imaginary entity, some conclusions are reached:

Beside of other factors, speed and duration, new aspects of the risk, are important determinants of the traditional risk element, the impact. It is quite normal to expect that both factors have a potential to affect impact factor in a positive relationship: increasing speed/duration means increasing impact.

While speed of risk is highly related with the organizational agility, duration of the risk relates with the resilience. Both of them need to be used in determining timing and structure of the risk responses.

In implementing portfolio view in risk management, in order to prioritize risks, a model that multiplies all factors of the risk can be used. But this time, determining the ranges will be critical.

Continuous risk assessment can be beneficial concept for the entities, which are operating in a rapidly changing environment.

Responsible parties in risk management process and assurance providers, including internal audit, need to consider all aspects of the risk for better results in responding risks. But note that adding new aspects of the risk into risk assessment process can increase complexity in decision-making steps and create additional burden of works. Thus, any entity that implements all aspects in risk assessment process needs to consider its objectives in risk assessment processes.

These two elements seem that somehow missed in literature since the number of studies on this topic is very limited and it is not easy to define existing studies as academic because of their scope and structure.

The aim of this study is to take attention on an issue, which is missed in literature. Further studies may focus on alternative implementations of risk aspects. In addition, integrating all aspects of the risk within risk management process can be a new research area for the studies.

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