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PPMAI speak

Process Plant and Machinery Association of India

Performance that never stops...

Dear Friends,

The year 2015 earned accolades for India. India has undergone a paradigm shift owing to its competitive stand in the world. The economy shows a robust growth strategy and projects a stable annual growth rate for the coming years.

India strongly pitched its healthy economic fundamentals at the recent World Economic Forum in Davos, Switzerland. Given India's growth amidst volatile global economic conditions, it has an ideal opportunity to capture the position as the world's primary growth engine and shift the mass of world economic activity towards itself.

Economic challenges globally, particularly in Euro zone and China has slowed down and will continue to slow down the global demand for the process equipment and related services. The negative impact from the decline of Oil & Gas prices will continue to perpetuate this markets low growth and even lead to contraction.

Domestic market, however, is showing mixed trends due to high investment and expected growth in infrastructure, pharma and energy sectors. New regulations are also driving investment in upgradation/modernization of plants. This has kept process equipment suppliers busy to some extent. With very few big ticket investments coming in, engineering companies are banking on evergreen sectors and overseas projects especially from Middle East and African countries for achieving sustainable growth.

The process plant and machinery industry is facing numerous challenges in today's market place.The most significant are need for continued innovation to take intense global competition, improving productivity, consistency in meeting the demands in quality and delivery as well as adapting to different consumer needs.

At PPMAI we have formed core groups at the Board level to support our Member organizations to address the challenges, especially with a focus on quality, market development, skill development and innovation. We expect the new Union Budget to provide us further insights and open future avenues for us. Let us look forward that year 2016 with expected GDP of more than 7% brings more opportunities and contributes to sustainable development of our sector.

Anil Rairikar
Chairman

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DISTILLATION COLUMNS

Distillation columns or towers are constructed to behave in the same way as a series of separate stills as discussed earlier. Each 'still' section consists of a number of 'TRAYS' or contacting devices arranged vertically above one another in the column. These trays or contactors bring liquid and vapour into intimate contact in order to obtain the required separation of the mixture. The height of the tower and the number of trays or contacting devices it contains depends upon the purity of the 'Fractions' required.

Columns for the distillation process can be of the following types:

1. The 'PACKED' Tower
2. The 'TRAY' Tower

1. THE PACKED TOWER

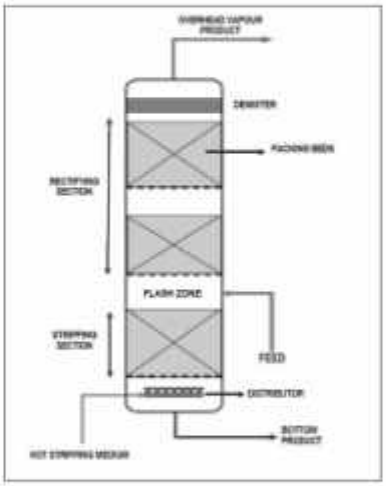


Figure: 10

As its name implies, the packed tower is a vertical, steel column which contains 'Beds' of packing material which are used to bring the rising vapours into intimate contact with falling liquid within the tower. The heat added to the mixture before entering the tower partially vaporises the mixture and the vapours rise up the tower and begin to cool.

The liquid falls towards the bottom of the tower. At the tower bottom, in general, more heat is added to the liquid by a 'Reboiler' which may be steam heated or a fuel fired furnace type.

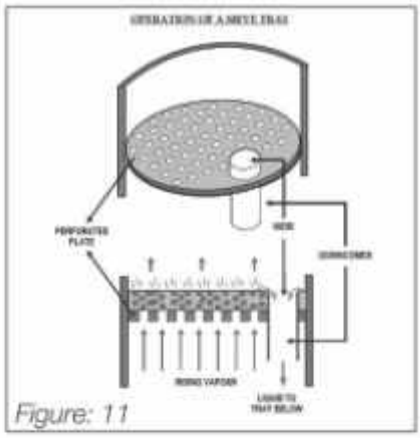


Figure: 11

The addition of heat here causes more vapours to rise up the column. As the two phases of the mixture - falling liquid and rising vapour - come together, light components are stripped out of the liquid and enter the gas phase while heavy components in the vapour are condensed into the liquid phase. In this way, as the vapour rises and gradually cools, it becomes lighter and, as the liquid falls, it becomes hotter and heavier.

With this type of distillation column there is generally only a top and bottom product. The quality of the products depends upon the height of the tower, the number of contacting devices, the tower temperature and pressure and their control, and the velocity of the rising vapours. The type of packing materials used, also plays a part in the separation process. The packing can be of such types as:

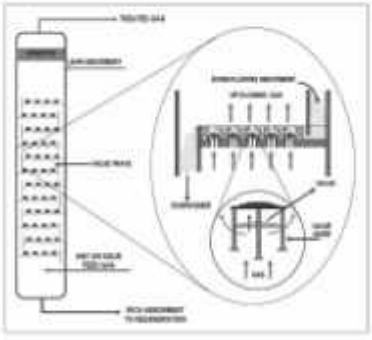


Figure: 12

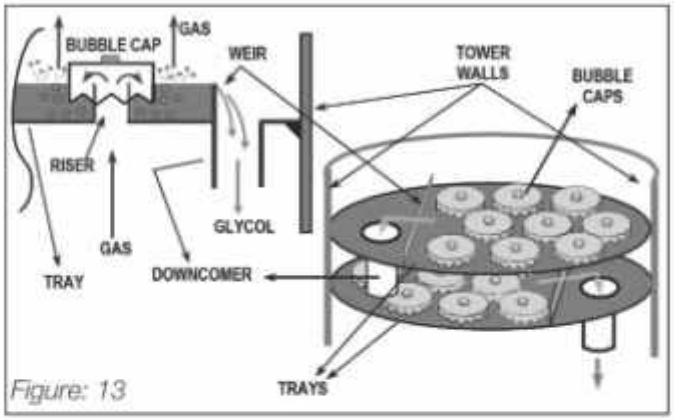


Figure: 13

Ceramic Raschig Rings, Stainless Steel Pall Rings or Ceramic Saddles ..etc. See Figure: 10.

2. THE TRAY TYPE TOWER

This is also a tall, cylindrical column. Inside, a series of trays are placed, one above the other. The trays are used to bring the rising vapour and falling liquid into intimate contact. Tray towers do the same job as packed towers but they are very much more efficient in the separation process than packed towers and, they are also more costly. There are various types of tray in use and the type selected depends upon the degree of product purity required, the type of fluids, fluid velocity and other process parameters of the system.

The types of tray used in distillation columns are as follows:

1) THE SIEVE TRAY is simply a metal plate containing drilled holes through which the rising vapour can pass into the liquid flowing

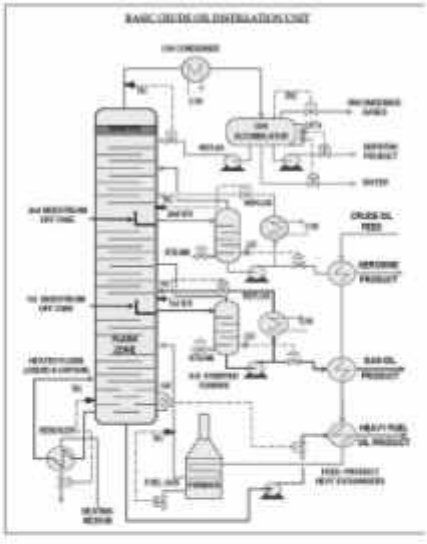


Figure: 14

across the tray. Figure: 11

2) THE VALVE TRAY is similar to the sieve type but, each hole is fitted with a flapper valve which opens as vapour passes through the hole. This type is used where vapour velocity is not constant and the valves prevent liquid from dumping through the holes at times of low gas velocity. Figure: 12

3) THE BUBBLE-CAP TRAY is the most efficient separation device but, is also the most costly. It consists of a number of 'Chimneys' or 'Risers' (small, short pipes set into the tray), through which the vapour can pass. Fitted over the riser is a 'Cap' which causes the rising vapour to turn through 180 °. This forces the gas to 'Bubble' through the liquid flowing across the tray. The liquid level on the tray is maintained below the top of the riser to prevent dumping of liquid down the tower. Figure: 13

Each of the above trays also has a 'WEIR' that maintains the liquid level on the tray. As the liquid flows over the weir, it enters a 'DOWNCOMER' - (a short pipe), that carries the liquid down to the tray below. The down comer outlet is below the surface of the liquid on the tray below, acting as a seal to prevent gas from bypassing the tray above.

The liquid is prevented from dumping through the perforations by the velocity of the up-flowing gas passing through them. The 'WEIR' maintains the liquid level on the tray and the gas is forced to bubble through the liquid. This gives intimate contact between the gas and liquid.

With the 'VALVE' tray, a non-return valve is fitted over each hole. This will close due to the weight of liquid at times of low gas velocity. See Figure: 12

SIMPLE CONTINUOUS DISTILLATION PROCESS

Refer to Figure: 14, as you read on. This represents a basic Crude Oil distillation column where the feed to, and the products from, the unit is a continuous operation.

In the distillation process, the crude oil feed is first heated by exchanging heat with some of the hot products leaving the column. This cools the products and, at the same time reduces the fuel requirements in the main heater - the fuel fired furnace.

The hot feed now enters the tower into the **'Flash Zone'**. At this point, due to the greatly increased volume of the column, the lighter components of the crude oil **' Flash Off '** (vaporise), and rise up the column. The hot liquid will fall towards the column bottom.

$$\text{Reflux ratio} = \frac{\text{Reflux}}{\text{Product}} = \frac{4\ \text{m}^3\ \text{per hour}}{2\ \text{m}^3\ \text{per hour}} = 2.0$$

The bottom section of the column, below the Flash Zone, called the 'Stripping Section', contains trays - generally Bubble-cap or Sieve type. The tower bottom liquid is re-circulated & re-heated in a steam or fired 'Reboiler' which drives off vapours of light ends and some of the heavy ends contained in the liquid. These vapours rise upwards through the trays and contact the down-flowing liquid. This action further removes (strips out), light ends from the liquid.

The top section of the tower, above the flash zone, is called the **'Rectifying Section'**. Here again, the rising vapour passing through the trays, contacts the liquid flowing across them.

Action of the Trays Each tray in the tower is acting like a single still as discussed in 'Batch Distillation'. As we rise above the flash zone, each succeeding tray is slightly cooler than the tray below. The down-flowing liquid (called 'Internal Reflux'), as it passes across the trays is becoming hotter and heavier as light ends boil off into the vapour phase. Conversely, the rising vapour is becoming cooler and lighter as heavier ends condense into the liquid on the tray.

At pre-determined points in the column, the process conditions (mainly temperature and pressure), are such that, the liquid components are at the required purity to meet the specification desired as a product - like 'Kerosene' for example. At these points, the tower will contain 'Collecting Pans' from which the desired product can be drawn from the tower.

The lightest components of the crude oil mixture leave the top of the tower as vapour. This is fed through condensers - generally water-cooled -and the condensate, usually Naphtha and water, passes into the 'Overhead Receiver or Accumulator'.

In the receiver, light gases also build up. The control of these gases, (to a fuel system or flare), also controls the pressure on the distillation process at the required level.

The Naphtha liquid forms an interface above the water. The water is drained away under control, to disposal. The Naphtha, also under level control, is divided into two - some is returned to the tower top tray as 'External Reflux' which is used to control the tower top temperature and thereby help to control the naphtha quality.

The remaining naphtha from the receiver is piped to storage and / or to other processes. The products leaving the side of the column -called 'Side-streams', are usually passed through 'Stripping Towers' where an injection of superheated steam removes final traces of light ends to meet the specification required for the product. The light ends and steam are passed back into the tower. The control of the quality of the side-stream products is generally helped by a controlled flow of 'Intermediate Reflux' of some of the product into the column just above the section producing the product. The side-stream products pass from the stripping towers through feed / product exchangers and water coolers to storage.

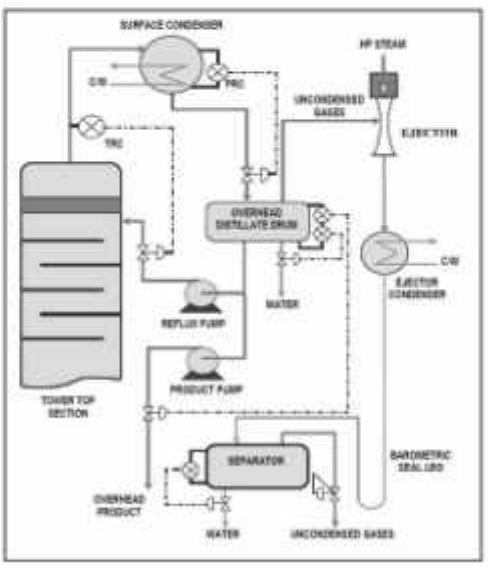


Figure: 15

The tower bottom product as already mentioned, is reheated in a reboiler to remove light ends and to provide stripping gases in the tower. The final bottom product, such as heavy fuel oil is pumped away via feed/product heat exchangers and water coolers to storage. In some distillation systems, superheated steam may be injected into the tower bottom to assist the stripping process. Crude oil distillation is often carried out under vacuum conditions. The vacuum is produced by pulling the overhead vapour from the tower by steam ejectors via surface condensers. The explanation of crude oil separation given above is that of a basic system. Crude oils also produce chemicals, waxes, gasolines, lubricants and many other products in everyday use.

DISTILLATION COLUMN CONTROL

1) REFLUX RATIO

2) TEMPERATURE GRADIENT

1. REFLUX RATIO

The reflux to a tower top is used to control the top temperature thereby controls the purity of the overhead product.

The amount of reflux compared to the product is known as the 'Reflux Ratio'.

An example of this is as follows:

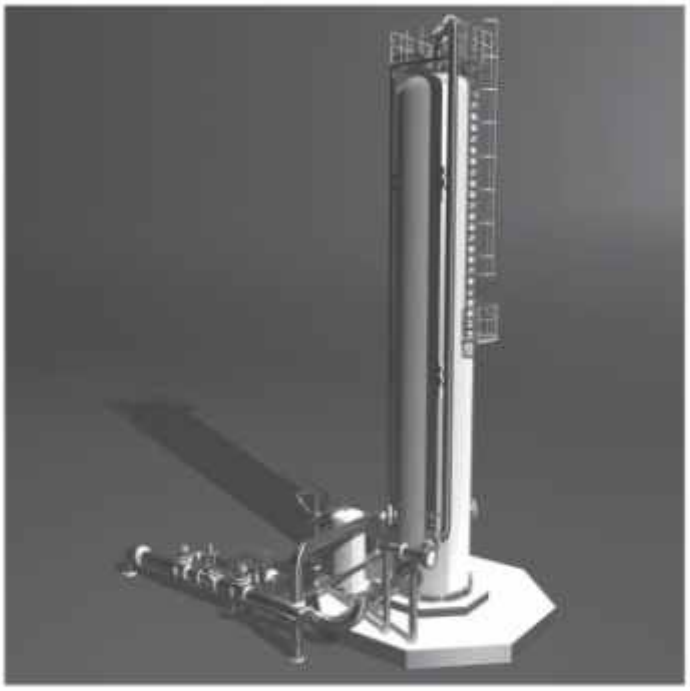
The overhead liquid from a distillation column is divided into 4 m3 per hour reflux and 2 m3 per hour product.

Therefore: When reflux ratio is increased, the amount of reflux increases. Reflux represents cooled, condensed top product returned to the tower top and, as such it is being reprocessed. The top product will therefore be purer. In general, the higher the reflux ratio, the fewer the number of trays required for a given separation.

However, too high a ratio may cause flooding in the tower resulting in poor separation and causing 'off-spec' products throughout the system. The reflux rate is normally controlled by a temperature controller in the vapour outlet which operates a control valve in the reflux pump discharge. An increase in tower top temperature will cause the valve to open, increasing the reflux rate, and vice versa.

2. TEMPERATURE GRADIENT

Temperature (and pressure) control of a distillation tower will govern the purity of the products. The control of top temperature is as discussed above in 'reflux'. Control of the feed inlet temperature and that of the reboiler are also very important. Again, if feed and bottom temperatures are too high, too much heavy vapour will rise up the tower and put side-stream products off-spec. This condition, combined with high reflux rate will again lead to flooding and poor separation. Opposite conditions can lead to liquid starvation across the trays and again, a very upset process will result.



The careful control of top temperature, feed and reboiler temperatures, together with pressure control, will give the desired temperature profile across the tower.

Remember, changes in pressure will affect the boiling points of the components in the crude oil. The vapour pressures therefore, will also be affected and again, if the control parameters are incorrect, the system will be inefficient.

Examples:

- High top temperature will result in heavy components in the overhead product.
- Low top temperature will result in a lighter top product.
- High feed temperature will give heavier side-streams and vice-versa.
- High reboiler temperature will produce heavier bottoms product and pass heavier vapours up the tower to affect the side-streams.
- Increased pressure in the system will give lighter components in the overhead LIQUID product and decrease its Initial Boiling Point, whereas the FBP is governed by the tower top temperature.

It can be seen that careful, accurate control of the variables is very important in order to achieve the required quality control of the products.

Also, with regard to the purity of the side-streams, control of the stripping towers' steam supply is very important.

A further point is, that high water content in the crude feed will cause pressure surges as the water vaporises in the tower. The crude oil should be as water free as possible.

Many modern distillation units are operated under high vacuum. This method, due to the vacuum decreasing the BP's of the components of the mixture to be separated, also reduces the amount of heat energy needed to vaporise the components.

VACUUM DISTILLATION TOWER OVERHEADS SYSTEM

In the above diagram, the surface condenser is a 'Total Condensing' unit. This means that all fluids that can be condensed are changed to liquid. Due to this, a vacuum is formed in the tower the level of which depends upon the degree of condensation allowed to take place. This is governed by the level of distillate and how much of the condensing surface is covered. The liquid level and therefore the amount of condensing surface available will decide the level of vacuum (Absolute Pressure) of the system.

The PRC is therefore controlling the available condensing area on the cooling tubes. Increasing absolute pressure (decreasing vacuum), will open the control valve, the liquid level in the condenser will fall thus presenting more condensing area to the vapour. More vapour will condense and therefore the pressure will drop back again - and vice-versa.

A small quantity of uncondensible gases will tend to build up in the tower and the surface condenser which, if allowed to build up, will slowly destroy the vacuum.

The ejector is used to remove the uncondensibles which are passed into the separator after passing through the ejector condenser which condenses the ejector steam – thus helping to maintain the vacuum, while the uncondensed gases are fed via a check-valve or control valve to atmosphere or flare system. The barometric seal loop holds a head of liquid which will prevent the vacuum pulling gases back out of the separator.

About the Author

Written by Norrie - Norrie is a retired professional who has been working in Oil and Gas and LNG production in Marsa-el-Brega, Libya for 30 years. Norrie used to be in the Training Dept. and prepared Programmes for Libyan Trainees

Words of wisdom

We are given a fresh start not only at the beginning of the year, but every morning when we wake up. We have the chance to start anew and make things right.

Enthusiasm is the baking power of life. Without it, you are flat, with it, you rise.

Money can buy you a lot of nice things, but all the money in the world can't buy contentment.

There is a light at the end of every tunnel: the sun returns after every storm.

Love looks beyond the exterior of a person and sees inside one's heart.

The world and everything in it is as beautiful as you perceive it to be.

We should never be afraid of tears. They soften our hearts, wash our eyes, and clear our vision.

Don't just throw out a vice; replace it with a virtue.

Be yourself! No one will be disillusioned when they discover the "real" you, it that's what they have known and loved all along.

Give to those in need. One day you may benefit from the kindness of someone who does likewise.

Love cannot be measured, bought, or sold. For it to be valued at all, it must be given freely.

Life is a combination of success and failure. – Both are needed.

Risk management is the identification, assessment, and prioritization of risks (defined in ISO 31000 as the effect of uncertainty on objectives) followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities. Risk management's objective is to assure uncertainty does not deflect the endeavor from the business goals.

Risks can come from various sources: e.g., uncertainty in financial markets, threats from project failures (at any phase in design, development, production, or sustainment life-cycles), legal liabilities, credit risk, accidents, natural causes and disasters as well as deliberate attack from an adversary, or events of uncertain or unpredictable root-cause. There are two types of events i.e. negative events can be classified as risks while positive events are classified as opportunities. Several risk management standards have been developed including the Project Management Institute, the National Institute of Standards and Technology, actuarial societies, and ISO standards. Methods, definitions and goals vary widely according to whether the risk management method is in the context of project management, security, engineering, industrial processes, financial portfolios, actuarial assessments, or public health and safety.

Risk sources are more often identified and located not only in infrastructural or technological assets and tangible variables, but also in human factor variables, mental states and decision making. The interaction between human factors and tangible aspects of risk highlights the need to focus closely on human factors as one of the main drivers for risk management, a "change driver" that comes first of all from the need to know how humans perform in challenging environments and in face of risks (Daniele Trevisani, 2007). As the author describes, «it is an extremely hard task to be able to apply an objective and systematic self-observation, and to make a clear and decisive step from the level of the mere "sensation" that something is going wrong, to the clear understanding of how, when and where to act. The truth of a problem or risk is often obfuscated by wrong or incomplete analyses, fake targets, perceptual illusions, unclear focusing, altered mental states, and lack of good communication and confrontation of risk management solutions with reliable partners. This makes the Human Factor aspect of Risk Management sometimes heavier than its tangible and technological counterpart»

Strategies to manage threats (uncertainties with negative consequences) typically include transferring the threat to another party, avoiding the threat, reducing the negative effect or probability of the threat, or even accepting some or all of the potential or actual consequences of a particular threat, and the opposites for opportunities (uncertain future states with benefits).

Certain aspects of many of the risk management standards have come under criticism for having no measurable improvement on risk, whereas the confidence in estimates and decisions seem to increase.[1]For example, it has been shown that one in six IT projects experience cost overruns of 200% on average, and schedule overruns of 70%.

Example of **risk management:** A NASA model showing areas at high risk from impact for the International Space Station

Introduction

Widely used vocabulary for risk management is defined by ISO Guide 73, "Risk management. Vocabulary.

In ideal risk management, a prioritization process is followed whereby the risks with the greatest loss (or impact) and the greatest probability of occurring are handled first, and risks with lower probability of occurrence and lower loss are handled in descending order. In practice the process of assessing overall risk can be difficult, and balancing resources used to mitigate between risks with a high probability of occurrence but lower loss versus a risk with high loss but lower probability of occurrence can often be mishandled.

Intangible risk management identifies a new type of a risk that has a 100% probability of occurring but is ignored by the organization due to a lack of identification ability. For example, when deficient knowledge is applied to a situation, a knowledge risk materializes. Relationship risk appears when ineffective collaboration occurs. Process-engagement risk may be an issue when ineffective operational procedures are applied. These risks directly reduce the productivity of knowledge workers, decrease cost-effectiveness, profitability, service, quality, reputation, brand value, and earnings quality. Intangible risk management allows risk management to create immediate value from the identification and reduction of risks that reduce productivity.

Risk management also faces difficulties in allocating resources. This is the idea of opportunity cost. Resources spent on risk

management could have been spent on more profitable activities. Again, ideal risk management minimizes spending (or manpower or other resources) and also minimizes the negative effects of risks.

Method

For the most part, these methods consist of the following elements, performed, more or less, in the following order.

1) identify, characterize threats
2) assess the vulnerability of critical assets to specific threats
3) determine the risk (i.e. the expected likelihood and cons quinces of specific types of attacks on specific assets)
4) identify ways to reduce those risks
5) prioritize risk reduction measures based on a strategy

Principles of risk management

The International Organization for Standardization (ISO) identifies the following principles of risk management:[7]

Risk management should:

- create value – resources expended to mitigate risk should be less than the consequence of inaction, or (as in value engineering), the gain should exceed the pain
- be an integral part of organizational processes
- be part of decision making process
- explicitly address uncertainty and assumptions
- be a systematic and structured process
- be based on the best available information
- be tailorable
- take human factors into account
- be transparent and inclusive
- be dynamic, iterative and responsive to change
- be capable of continual improvement and enhancement
- be continually or periodically re-assessed

Process

According to the standard ISO 31000 "Risk management – Principles and guidelines on implementation,"[4] the process of risk management consists of several steps as follows:

Establishing the context

This involves:

1) identification of risk in a selected domain of interest
2) planning the remainder of the process
3) mapping out the following:
   - the social scope of risk management
   - the identity and objectives of stakeholders
   - the basis upon which risks will be evaluated, constraints.
4) defining a framework for the activity and an agenda for identif cation
5) developing an analysis of risks involved in the process
6) mitigation or solution of risks using available technological, human and organizational resources.

Identification

After establishing the context, the next step in the process of managing risk is to identify potential risks. Risks are about events that, when triggered, cause problems or benefits. Hence, risk identification can start with the source of our problems and those of our competitors (benefit), or with the problem itself.

Source analysis - Risk sources may be internal or external to the system that is the target of risk management (use mitigation instead of management since by its own definition risk deals with factors of decision-making that cannot be managed).

Examples of risk sources are: stakeholders of a project, employees of a company or the weather over an airport.

Problem analysis] - Risks are related to identified threats. For example: the threat of losing money, the threat of abuse of confidential information or the threat of human errors, accidents and casualties. The threats may exist with various entities, most important with shareholders, customers and legislative bodies such as the government.

When either source or problem is known, the events that a source may trigger or the events that can lead to a problem can be investigated. For example: stakeholders withdrawing during a project may endanger funding of the project; confidential information may be stolen by employees even within a closed network; lightning striking an aircraft during takeoff may make all people on board immediate casualties.

The chosen method of identifying risks may depend on culture, industry practice and compliance. The identification methods are formed by templates or the development of templates for identifying source, problem or event. Common risk identification methods are:

Objectives-based risk identification - Organizations and project teams have objectives. Any event that may endanger achieving an objective partly or completely is identified as risk.

Scenario-based risk identification - In scenario analysis different scenarios are created. The scenarios may be the alternative ways to achieve an objective, or an analysis of the interaction of forces in, for example, a market or battle. Any event that triggers an undesired scenario alternative is identified as risk – seeFutures Studies for methodology used by Futurists.

Taxonomy-based risk identification - The taxonomy in taxonomy-based risk identification is a breakdown of possible risk sources. Based on the taxonomy and knowledge of best practices, a questionnaire is compiled. The answers to the questions reveal risks.

Common-risk checking - In several industries, lists with known risks are available. Each risk in the list can be checked for application to a particular situation.

Risk charting - This method combines the above approaches by listing resources at risk, threats to those resources, modifying factors which may increase or decrease the risk and consequences it is wished to avoid. Creating a matrix under these headings enables a variety of approaches. One can begin with resources and consider the threats they are exposed to and the consequences of each. Alternatively one can start with the threats and examine which resources they would affect, or one can begin with the consequences and determine which combination of threats and resources would be involved to bring them about.

Assessment

Once risks have been identified, they must then be assessed as to their potential severity of impact (generally a negative impact, such as damage or loss) and to the probability of occurrence. These quantities can be either simple to measure, in the case of the value of a lost building, or impossible to know for sure in the case of the probability of an unlikely event occurring. Therefore, in the assessment process it is critical to make the best educated decisions in order to properly prioritize the implementation of

the risk management plan.

Even a short-term positive improvement can have long-term negative impacts. Take the "turnpike" example. A highway is widened to allow more traffic. More traffic capacity leads to greater development in the areas surrounding the improved traffic capacity. Over time, traffic thereby increases to fill available capacity. Turnpikes thereby need to be expanded in a seemingly endless cycles. There are many other engineering examples where expanded capacity (to do any function) is soon filled by increased demand. Since expansion comes at a cost, the resulting growth could become unsustainable without forecasting and management.

The fundamental difficulty in risk assessment is determining the rate of occurrence since statistical information is not available on all kinds of past incidents. Furthermore, evaluating the severity of the consequences (impact) is often quite difficult for intangible assets. Asset valuation is another question that needs to be addressed. Thus, best educated opinions and available statistics are the primary sources of information. Nevertheless, risk assessment should produce such information for the management of the organization that the primary risks are easy to understand and that the risk management decisions may be prioritized. Thus, there have been several theories and attempts to quantify risks. Numerous different risk formulae exist, but perhaps the most widely accepted formula for risk quantification is:

Rate (or probability) of occurrence multiplied by the impact of the event equals risk magnitude.

Composite risk index

The above formula can also be re-written in terms of a composite risk index, as follows:

composite risk index = impact of risk event x probability of occurrence

The impact of the risk event is commonly assessed on a scale of 1 to 5, where 1 and 5 represent the minimum and maximum possible impact of an occurrence of a risk (usually in terms of financial losses). However, the 1 to 5 scale can be arbitrary and need not be on a linear scale.

The probability of occurrence is likewise commonly assessed on a scale from 1 to 5, where 1 represents a very low probability of the risk event actually occurring while 5 represents a very high probability of occurrence. This axis may be expressed in either mathematical terms (event occurs once a year, once in ten years, once in 100 years etc.) or may be expressed in "plain English" (event has occurred here very often; event has been known to occur here; event has been known to occur in the industry etc.). Again, the 1 to 5 scale can be arbitrary or non-linear depending on decisions by subject-matter experts.

The composite risk index thus can take values ranging (typically) from 1 through 25, and this range is usually arbitrarily divided into three sub-ranges. The overall risk assessment is then Low, Medium or High, depending on the sub-range containing the calculated value of the Composite Index. For instance, the three sub-ranges could be defined as 1 to 8, 9 to 16 and 17 to 25.

Note that the probability of risk occurrence is difficult to estimate, since the past data on frequencies are not readily available, as mentioned above. After all, probability does not imply certainty.

Likewise, the impact of the risk is not easy to estimate since it is often difficult to estimate the potential loss in the event of risk occurrence.

Further, both the above factors can change in magnitude depending on the adequacy of risk avoidance and prevention measures taken and due to changes in the external business environment. Hence it is absolutely necessary to periodically re-assess risks and intensify/relax mitigation measures, or as necessary. Changes in procedures, technology, schedules, budgets, market conditions, political environment, or other factors typically require re-assessment of risks.

Risk options

Risk mitigation measures are usually formulated according to one or more of the following major risk options, which are:

1) Design a new business process with adequate built-in risk control and containment measures from the start.
2) Periodically re-assess risks that are accepted in ongoing processes as a normal feature of business operations and modify mitigation measures.
3) Transfer risks to an external agency (e.g. an insurance company)
4) Avoid risks altogether (e.g. by closing down a particular high-risk business area)

Later research has shown that the financial benefits of risk management are less dependent on the formula used but are more dependent on the frequency and how risk assessment is performed.

In business it is imperative to be able to present the findings of risk assessments in financial, market, or schedule terms. Robert Courtney Jr. (IBM, 1970) proposed a formula for presenting risks in financial terms. The Courtney formula was accepted as the official risk analysis method for the US governmental agencies. The formula proposes calculation of ALE (annualized loss expectancy) and compares the expected loss value to the security control implementation costs (cost-benefit analysis).

Potential risk treatments

Once risks have been identified and assessed, all techniques to manage the risk fall into one or more of these four major categories:

- Avoidance (eliminate, withdraw from or not become involved)
- Reduction (optimize – mitigate)
- Sharing (transfer – outsource or insure)
- Retention (accept and budget)

Ideal use of these strategies may not be possible. Some of them may involve trade-offs that are not acceptable to the organization or person making the risk management decisions. Another source, from the US Department of Defense (see link), Defense Acquisition University, calls these categories ACAT, for Avoid, Control, Accept, or Transfer. This use of the ACAT acronym is reminiscent of another ACAT (for Acquisition Category) used in US Defense industry procurements, in which Risk Management figures prominently in decision making and planning.

Risk avoidance

This includes not performing an activity that could carry risk. An example would be not buying a property or business in order to not take on the legal liability that comes with it. Another would be not flying in order not to take the risk that the airplane were to be hijacked. Avoidance may seem the answer to all risks, but avoiding risks also means losing out on the potential gain that accepting (retaining) the risk may have allowed. Not entering a business to avoid the risk of loss also avoids the possibility of earning profits. Increasing risk regulation in hospitals has led to avoidance of treating higher risk conditions, in favor of patients presenting with lower risk.

Hazard prevention

Hazard prevention refers to the prevention of risks in an emergency. The first and most effective stage of hazard prevention is the elimination of hazards. If this takes too long, is too costly, or is otherwise impractical, the second stage is mitigation.

Risk reduction

Risk reduction or "optimization" involves reducing the severity of the loss or the likelihood of the loss from occurring. For example, sprinklers are designed to put out a fire to reduce the risk of loss by fire. This method may cause a greater loss by water damage and therefore may not be suitable. Halon fire suppression systems may mitigate that risk, but the cost may be prohibitive as a strategy.

Acknowledging that risks can be positive or negative, optimizing risks means finding a balance between negative risk and the benefit of the operation or activity; and between risk reduction and effort applied. By an offshore drilling contractor effectively applying HSE Management in its organization, it can optimize risk to achieve levels of residual risk that are tolerable.

Modern software development methodologies reduce risk by developing and delivering software incrementally. Early methodologies suffered from the fact that they only delivered software in the final phase of development; any problems encountered in earlier phases meant costly rework and often jeopardized the whole project. By developing in iterations, software projects can limit effort wasted to a single iteration.

Outsourcing could be an example of risk reduction if the outsourcer can demonstrate higher capability at managing or reducing risks.[14] For example, a company may outsource only its software development, the manufacturing of hard goods, or customer support needs to another company, while handling the business management itself. This way, the company can concentrate more on business development without having to worry as much about the manufacturing process, managing the development team, or finding a physical location for a call center.

Risk sharing

Briefly defined as "sharing with another party the burden of loss or the benefit of gain, from a risk, and the measures to reduce a risk."

The term of 'risk transfer' is often used in place of risk sharing in the mistaken belief that you can transfer a risk to a third party through insurance or outsourcing. In practice if the insurance company or contractor go bankrupt or end up in court, the original risk is likely to still revert to the first party. As such in the terminology of practitioners and scholars alike, the purchase of an insurance contract is often described as a "transfer of risk." However, technically speaking, the buyer of the contract generally retains legal responsibility for the losses "transferred", meaning that insurance may be described more accurately as a post-event compensatory mechanism. For example, a personal injuries insurance policy does not transfer the risk of a car accident to the insurance company. The risk still lies with the policy holder namely the person who has been in the accident. The insurance policy simply provides that if an accident (the event) occurs involving the policy holder then some compensation may be payable to the policy holder that is commensurate with the suffering/damage.

Some ways of managing risk fall into multiple categories. Risk retention pools are technically retaining the risk for the group, but spreading it over the whole group involves transfer among individual members of the group. This is different from traditional insurance, in that no premium is exchanged between members of the group up front, but instead losses are assessed to all members of the group.

Risk retention

Involves accepting the loss, or benefit of gain, from a risk when it occurs. True self insurance falls in this category. Risk retention is a viable strategy for small risks where the cost of insuring against the risk would be greater over time than the total losses sustained. All risks that are not avoided or transferred are retained by default. This includes risks that are so large or catastrophic that they either cannot be insured against or the premiums would be infeasible. War is an example since most property and risks are not insured against war, so the loss attributed by war is retained by the insured. Also any amounts of potential loss (risk) over the amount insured is retained risk. This may also be acceptable if the chance of a very large loss is small or if the cost to insure for greater coverage amounts is so great it would hinder the goals of the organization too much.

Risk management plan

Select appropriate controls or countermeasures to measure each risk. Risk mitigation needs to be approved by the appropriate level of management. For instance, a risk concerning the image of the organization should have top management decision behind it whereas IT management would have the authority to decide on computer virus risks.

The risk management plan should propose applicable and effective security controls for managing the risks. For example, an observed high risk of computer viruses could be mitigated by acquiring and implementing antivirus software. A good risk management plan should contain a schedule for control implementation and responsible persons for those actions.

According to ISO/IEC 27001, the stage immediately after completion of the risk assessment phase consists of preparing a Risk Treatment Plan, which should document the decisions about how each of the identified risks should be handled. Mitigation of risks often means selection of security controls, which should be documented in a Statement of Applicability, which identifies which particular control objectives and controls from the standard have been selected, and why.

Implementation

Implementation follows all of the planned methods for mitigating the effect of the risks. Purchase insurance policies for the risks that have been decided to be transferred to an insurer, avoid all risks that can be avoided without sacrificing the entity's goals, reduce others, and retain the rest.

Review and evaluation of the plan

Initial risk management plans will never be perfect. Practice, experience, and actual loss results will necessitate changes in the plan and contribute information to allow possible different decisions to be made in dealing with the risks being faced.

Risk analysis results and management plans should be updated periodically. There are two primary reasons for this:

1) to evaluate whether the previously selected security controls are still applicable and effective
2) to evaluate the possible risk level changes in the business environment. For example, information risks are a good example of rapidly changing business environment.

Limitations

Prioritizing the risk management processes too highly could keep an organization from ever completing a project or even getting started. This is especially true if other work is suspended until the risk management process is considered complete.

It is also important to keep in mind the distinction between risk and uncertainty. Risk can be measured by impacts x probability.

If risks are improperly assessed and prioritized, time can be wasted in dealing with risk of losses that are not likely to occur. Spending too much time assessing and managing unlikely risks can divert resources that could be used more profitably. Unlikely events do occur but if the risk is unlikely enough to occur it may be better to simply retain the risk and deal with the result if the loss does in fact occur. Qualitative risk assessment is subjective and lacks consistency. The primary justification for a formal risk assessment process is legal and bureaucratic.

Areas of risk management

As applied to corporate finance, risk management is the technique for measuring, monitoring and controlling the financial or operational risk on a firm's balance sheet. See value at risk.

The Basel II framework breaks risks into market risk (price risk), credit risk and operational risk and also specifies methods for calculating capital requirements for each of these components.

Enterprise risk management

In enterprise risk management, a risk is defined as a possible event or circumstance that can have negative influences on the enterprise in question. Its impact can be on the very existence, the resources (human and capital), the products and services, or the customers of the enterprise, as well as external impacts on society, markets, or the environment. In a financial institution, enterprise risk management is normally thought of as the combination of credit risk, interest rate risk or asset liability management, liquidity risk, market risk, and operational risk.

In the more general case, every probable risk can have a pre-formulated plan to deal with its possible consequences (to ensure contingency if the risk becomes a liability).

From the information above and the average cost per employee over time, or cost accrual ratio, a project manager can estimate:

- the cost associated with the risk if it arises, estimated by multiplying employee costs per unit time by the estimated time lost (cost impact, C where C = cost accrual ratio * S).
- the probable increase in time associated with a risk (schedule variance due to risk, Rs where Rs = P * S):
  - Sorting on this value puts the highest risks to the schedule first. This is intended to cause the greatest risks to the project to be attempted first so that risk is minimized as quickly as possible.
  - This is slightly misleading as schedule variances with a large P and small S and vice versa are not equivalent. (The risk of the RMS Titanic sinking vs. the passengers' meals being served at slightly the wrong time).
- the probable increase in cost associated with a risk (cost variance due to risk, Rc where Rc = P*C = P*CAR*S = P*S*CAR)
  - sorting on this value puts the highest risks to the budget first.
  - see concerns about schedule variance as this is a function of it, as illustrated in the equation above.

Risk in a project or process can be due either to Special Cause Variation or Common Cause Variation and requires appropriate treatment. That is to re-iterate the concern about extremal cases not being equivalent in the list immediately above.

Medical device risk management

For medical devices, risk management is a process for identifying, evaluating and mitigating risks associated with harm to people and damage to property or the environment. Risk management is an integral part of medical device design and development, production processes and evaluation of field experience, and is applicable to all types of medical devices. The evidence of its application is required by most regulatory bodies such as FDA. The management of risks for medical devices is described by the International Organization for Standardization (ISO) in ISO 14971:2007, Medical Devices—The application of risk management to medical devices, a product safety standard. The standard provides a process framework and associated requirements for management responsibilities, risk analysis and evaluation, risk controls and lifecycle risk management.

The European version of the risk management standard was updated in 2009 and again in 2012 to refer to the Medical Devices Directive (MDD) and Active Implantable Medical Device Directive (AIMDD) revision in 2007, as well as the In Vitro Medical Device Directive (IVDD). The requirements of EN 14971:2012 are nearly identical to ISO 14971:2007. The differences include an Annex that refers to the new MDD and AIMDD, the requirement for risks to be reduced as low as possible, and the requirement that risks be mitigated by design and not by labeling on the medical device (i.e., labeling can no longer be used to mitigate risk).

Typical risk analysis and evaluation techniques adopted by the medical device industry include hazard analysis, fault tree analysis (FTA), failure mode and effect analysis (FMEA), hazard and operability study (HAZOP), and risk traceability analysis for ensuring risk controls are implemented and effective (i.e. tracking risks identified to product requirements, design specifications, verification and validation results etc.)

FTA analysis requires diagramming software. FMEA analysis can be done using a spreadsheet program. There are also integrated medical device risk management solutions.

Through a draft guidance, FDA has introduced another method named "Safety Assurance Case" for medical device safety assurance analysis. The safety assurance case is structured argument reasoning about systems appropriate for scientists and engineers, supported by a body of evidence, that provides a compelling, comprehensible and valid case that a system is safe for a given application in a given environment. With the guidance, a safety assurance case is expected for safety critical devices (e.g. infusion devices) as part of the pre-market clearance submission, e.g. 510(k). In 2013, FDA introduced another draft guidance expecting medical device manufacturers to submit cybersecurity risk analysis information.

Risk management activities as applied to project management

In project management, risk management includes the following activities:

- Planning how risk will be managed in the particular project. Plans should include risk management tasks, responsibilities, activities and budget.
- Assigning a risk officer – a team member other than a project manager who is responsible for foreseeing potential project problems. Typical characteristic of risk officer is a healthy skepticism.
- Maintaining live project risk database. Each risk should have the

following attributes: opening date, title, short description, probability and importance. Optionally a risk may have an assigned person responsible for its resolution and a date by which the risk must be resolved.
- Creating anonymous risk reporting channel. Each team member should have the possibility to report risks that he/she foresees in the project.
- Preparing mitigation plans for risks that are chosen to be mitigated. The purpose of the mitigation plan is to describe how this particular risk will be handled – what, when, by whom and how will it be done to avoid it or minimize consequences if it becomes a liability.
- Summarizing planned and faced risks, effectiveness of mitigation activities, and effort spent for the risk management.

Risk management for megaprojects (infrastructure)

Megaprojects (sometimes also called "major programs") are extremely large-scale investment projects, typically costing more than US$1 billion per project. Megaprojects include bridges, tunnels, highways, railways, airports, seaports, power plants, dams, wastewater projects, coastal flood protection schemes, oil and natural gas extraction projects, public buildings, information technology systems, aerospace projects, and defense systems. Megaprojects have been shown to be particularly risky in terms of finance, safety, and social and environmental impacts.[18] Risk management is therefore particularly pertinent for megaprojects and special methods and special education have been developed for such risk management.

Risk management regarding natural disasters

It is important to assess risk in regard to natural disasters like floods, earthquakes, and so on. Outcomes of natural disaster risk assessment are valuable when considering future repair costs, business interruption losses and other downtime, effects on the environment, insurance costs, and the proposed costs of reducing the risk. There are regular conferences in Davos to deal with integral risk management.

Risk management of information technology

Information technology is increasingly pervasive in modern life in every sector.

IT risk is a risk related to information technology. This is a relatively new term due to an increasing awareness that information security is simply one facet of a multitude of risks that are relevant to IT and the real world processes it supports.

A number of methodologies have been developed to deal with this kind of risk alongside adaptations of existing practices to new paradigms including agile risk management.

ISACA's Risk IT framework ties IT risk to enterprise risk management.

Risk management techniques in petroleum and natural gas

For the offshore oil and gas industry, operational risk management is regulated by the safety case regime in many countries. Hazard identification and risk assessment tools and techniques are described in the international standard ISO 17776:2000, and organisations such as the IADC (International Association of Drilling Contractors) publish guidelines for HSE Case development which are based on the ISO standard. Further, diagrammatic representations of hazardous events are often expected by governmental regulators as part of risk management in safety case submissions; these are known as bow-tie diagrams. The technique is also used by organisations and regulators in mining, aviation, health, defence, industrial and finance.

Risk management as applied to the pharmaceutical sector

The principles and tools for quality risk management are increasingly being applied to different aspects of pharmaceutical quality systems. These aspects include development, manufacturing, distribution, inspection, and submission/review processes throughout the lifecycle of drug substances, drug products, biological and biotechnological products (including the use of raw materials, solvents, excipients, packaging and labeling materials in drug products, biological and biotechnological products). Risk management is also applied to the assessment of microbiological contamination in relation to pharmaceutical products and cleanroom manufacturing environments.

Risk management and business continuity

Risk management is simply a practice of systematically selecting cost-effective approaches for minimising the effect of threat realization to the organization. All risks can never be fully avoided or mitigated simply because of financial and practical limitations. Therefore, all organizations have to accept some level of residual risks.

Whereas risk management tends to be preemptive, business continuity planning (BCP) was invented to deal with the consequences of realised residual risks. The necessity to have BCP in place arises because even very unlikely events will occur if given enough time. Risk management and BCP are often mistakenly seen as rivals or overlapping practices. In fact, these processes are so tightly tied together that such separation seems artificial. For example, the risk management process creates important inputs for the BCP (e.g., assets, impact assessments, cost estimates). Risk management also proposes applicable controls for the observed risks. Therefore, risk management covers several areas that are vital for the BCP process. However, the BCP process goes beyond risk management's preemptive approach and assumes that the disaster will happen at some point.

Risk communication

Risk communication is a complex cross-disciplinary academic field related to core values of the targeted audiences. Problems for risk communicators involve how to reach the intended audience, to make the risk comprehensible and relatable to other risks, how to pay appropriate respect to the audience's values related to the risk, how to predict the audience's response to the communication, etc. A main goal of risk communication is to improve collective and individual decision making. Risk communication is somewhat related to crisis communication.

Digital risk management

The digital era brings a paradigm shift. Digital risk is risk arising from increased dependency on information technology systems and digital processes. It will become a major challenge for the new evolving executive role of 'digital' risk officer.

Executives are accountable for both operational performance and achieving strategic objectives. There is now a need for executives to understand the direct alignment of digital risks with the strategic business goals of the enterprise. Digital risk management is the next evolution in 'digital risk and security strategies'. It is about re-defining corporate governance and 'digital perpetuation' Digital perpetuation and should form part of the digital risk management plan.

What is Crowd-funding?

Crowd-funding is the pooling of resources by a group of people for a common goal. This concept is not new to India. However, the emergence of platforms that promote crowd-funding is fairly recent to India. These platforms help start-ups or small businesses meet their funding requirements. The entrepreneur community in India needs a successful and widely accepted Indian version of crowdfunding platforms like Kickstarter, Indiegogo which not only helps Startups/individuals to launch a product but to also test the acceptance of the product in the market.

Currently, no crowd-funding regulation exists in India, but the Securities and Exchange Board of India (SEBI) released a consultation paper last year where it spoke about need for regulation. Within India, if one looks a little closely, the crowd-funding platforms themselves fall into three broad categories

Crowdfunding sites in India - opportunity and facts					
	CATEGORY	FUNDSRAISED SO FAR	UPFRONT LISTING FEE	SITE FEE	PAYMENT PROCESSING FEE
BITGIVING	Social Causes	35 Lacs INR*	FREE	???	???
MILAAP	Social Causes	4.15Million USD as Loan disbursed	FREE	Their Website says that 100% amount is disbursed to borrowers	???
KETTO.ORG	ALL	4 Crores INR	FREE	5%	5%
STARTS1	ALL	INR 16,05,062	FREE	5%	???
FUNDDREAMSINDIA	ALL	???	FREE	5%	3.95%
WISHBERRY.IN	ALL	4.5CRORES INR	Rs. 2500PLUS taxes	10% (Includes payment Processing)	NA
CATAPULT	ALL	75Lacs +INR	Rs. 1499	Standard 10% Premium 15% Advanced 15% Plus	???

namely Social causes, Business/Startups and Arts & Culture.

Listed below are some of the Indian based crowd-funding platforms available for Indians along with their statistics:

The Concept of Crowd-funding

There are primarily 4 types of crowd-funding models which have recently come into practice:

Donation Based Crowd-funding:

• Herein, funds are raised via public campaigns and outreach programmes, eg, raising funds for a private scholarship by an individual

• This option might not be really viable in the long term due to its non-rewarding nature unless done for a public purpose which reaps benefit for the society as a whole.

Rewards Based Model:

• Provides a certain attraction to its investors, tangible or intangible, varying from services provided to goods offered.

• No equity options for the investors where they can reap a long term reward, though the kind of rewards proposed to the investors by targeting their intent of investment and fulfillment other than giving equity returns.

Equity Model:

• Funding where investors are made partakers of the equity and profit earned by the business.

• For any investor, return on investment is the basic criteria. Equity ownership brings confidence in terms of decision making, security of funds and accountability.

Lending Model:

• Parallel to the model of raising equity by debt, where money can be raised by taking loans from various investors by offering something in addition to the interest on the loan.

• This model involves high risk, as start-ups may not be able to afford such loans at a high rate of interest, and repayment of the loan may result into bad debts in case of failure of business.

Practicability of donation based crowd-funding...

Of the four crowd-funding models, donation based crowd-funding is the most pragmatic approach as of now. Lending based microfinance platforms like Kiva need approvals from the central bank. The Reserve Bank of India in 2011 approved Milaap, a non-profit microfinance institution to crowd source funds from overseas. The approval, a first in the industry, was seen as a major boost to crowd-funding.

Crowd-funding Across the Globe

Crowd-funding across the globe has recently taken the limelight with a lot of multi-million companies which have taken the recourse to crowd-funding for their various ventures. Companies like 'GE' have set forth a large crowd-funding model and have partnered with "Local Motors" to develop "FirstBuild", a website which connects engineers to manufacturers and have successfully raised $2.5 Million.

The precursor to raising any investment via crowd-funding is an appropriate and attractive crowd-funding campaign, which requires public funding, usually done by close relatives, family and friends, which attract around 25-40% first hand investments. Social media has been successful in connecting people across various time zones and access to knowledge and ideologies.

In order to make this more regulated, the US security and Exchange Commission (SEC) have laid down some guidelines for regulating crowd-funding detailed out in their "A+" factsheet which are as follows:

1) Tier 1, which would consist of securities offerings of up to $20 million in a 12-month period, with not more than $6 million in offers by selling security-holders that are affiliates of the issuer.

2) Tier 2, which would consist of securities offerings of up to $50 million in a 12-month period, with not more than $15 million in offers by selling security-holders that are affiliates of the issuer.

Crowd-funding for Medium and Small Enterprises (MSME)

Access to finance is one of the most pressing problems for SMEs who report a deterioration in public financial support (-13%), access to loans (11%), trade credit (-4%) and the willingness of investors to invest in equity (-1%). Many projects' demand for financing is not met by any existing sources of finance, which is referred to generally as the financing gap. Crowd-funding matches small – or even bigger – contributors and investors directly with the projects in need of funds, mainly in the early stages.

Crowd-funding: Issues and Prospects

Issues

Peer-to-Peer lending may fall under the purview of Reserve Bank of India. The Reserve Bank of India is yet to bring about any circulars to give clarity to such P2P lending. Therefore, while equity and security related crowd-funding will be governed by SEBI, lending based crowd-funding will be governed by RBI. For Pure Donation Based Crowd-funding statutes like Foreign Contribution Regulation Act, 2010 may also come into play. The major issue will be if a crowd-funding by more than fifty people in the form of equity crowd-funding will amount to public offer under Companies Act, 2013 and SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2009.

Prospects

Crowd-funding will be a much needed elixir for start-ups if the regulators manage to keep things uncomplicated. A lot of Section 8 companies (not-for-profit), charitable trusts and NGOs/NPOs can benefit immensely out of crowd-funding if it is extended to them by law.

Further, a huge beneficiary will be art and culture related ventures such as movies, music albums, documentaries and theatre production. They will be able raise money from hundreds of persons like a public issue. Moreover, to safeguard the interest of investors only such investors should be allowed to invest who are able to bear the risk involved and by entities which have a clean track record.

Who can be an Investor?

SEBI proposes Rs 10 Cr limit for equity-based crowd-funding; only accredited investors

In Indian scenario, considering the necessity to provide alternative funding sources to startups while ensuring that retail investors are not made to bear the risks of these ventures, SEBI has proposed to permit only Accredited Investors to participate in crowd-funding.

The proposed accredited investors who may be allowed to invest through crowd-funding platforms are as under:

1: Qualified Institutional Buyers (QIBs) as defined in SEBI (Issue of Capital and Disclosure Requirements) regulations, 2009 as amended from time to time,

2: Companies incorporated under the Companies Act of India, with a minimum net worth of Rs 20 crore.

3: High Net Worth Individuals (HNIs) with a minimum net worth Rs. 2 Crores or more (excluding the value of the primary residence or any loan secured on such property)

4: Eligible Retail Investors (ERIs):

– who receive investment advice from an Investment Adviser, or

– who avail services of a Portfolio manager, or

– who have passed an Appropriateness Test (may be conducted by an institution accredited by NISM or the crowd-funding platforms),

– who have a minimum annual gross income of Rs. 10 lakhs.

– who have filed Income Tax return for at least last 3 financial years,

– who certify that they will not invest more than Rs. 60,000 in an issue through crowd-funding platform,

– who certify that they will not invest more than 10% of their net worth through crowd-funding. (Net worth excludes the value of the primary residence or any loan secured on such property).

The **ERIs must be an Indian citizen or an NRI.** Investments by foreign investors shall be subject to guidelines as may be specified by RBI and government of India from time to time.

Net Worth is calculated as the aggregate value of paid up equity capital plus free reserves (excluding reserves created out of revaluation) reduced by the aggregate value of accumulated losses and deferred expenditure not written off, including miscellaneous expenses not written off.

Investment Limit

A QIB is required to purchase at least 5 times of the minimum offer value per person as specified in the aforementioned rule. Collectively all the QIBs shall hold a minimum of 5% of the securities issued.

– A company is required to purchase at least 4 times of the minimum offer value per person as specified in the aforementioned rule.

– A HNI is required to purchase at least 3 times the minimum offer value per person.

– An ERI is required to purchase at least the minimum offer value per person. The maximum investment by an ERI in an issue shall not exceed Rs. 60,000. The total of all investments in crowd-funding for an eligible retail investor in a year should not exceed 10% of its net worth.

Who can Raise Funding Through Crowd-funding?

1) The company should be seeking to raise not more than Rs 10 crore and list them on a SME Platform or main board of a recognized stock exchange. The company should not be more be more than 48 months old and must not be listed on any exchange already.

2) The company should not be promoted, sponsored or related to an industrial group which has a turnover in excess of Rs 25 Crores or has an established business.

3) The company should engage in non-finance ventures, real estate or in activities which are not permitted under industrial policy of Government of India.

4) The issuing company should not be a known defaulter as noted by RBI or CIBIL.

5) If the directors or promoters of the existing companies have been prohibited from operating in capital market, then the company cannot use equity-based crowd-funding. The directors should not be disqualified under Companies Act 2013.

6) In a period of 12 months there cannot be multiple crowd-funding campaigns by the same company.

7) Issuers shall not directly or indirectly advertise their offering to public in general or solicit investments from the public.

8) Issuer shall compulsorily route all crowd-funding issues through a SEBI recognized crowd-funding platform.

9) Issuers shall not directly or indirectly incentivize or compensate any person to promote its offering.

10) Issuers shall provide provisions for oversubscription. This may include maximum oversubscription amount to be retained, which should not exceed 25% of the actual issue size; intended usage of the oversubscribed amount. The total amount retained, including the actual issue size and oversubscription, shall not exceed the limit of Rs. 10 Crores.

Disclosures needed...

SEBI has also proposed that a company intending to raise funds through crowd-funding platform should disclose the amount it is looking to raise in a Private Placement Offer Letter. This letter should also describe current venture for which the funds are being raised, issue Size and specified target offering amount and intended usage of funds, description on the valuation of securities offered, past history of funding, history of any prior refusal from any crowd-funding platform, a description of financial condition of the company, ownership details and capital structure & details regarding board and management, among others. This letter shall be circulated online only to those selected accredited investors registered with the crowd-funding platform and have made a commitment, not numbering more than 200, and excluding QIBs.

Apart from this, the participating companies need to provide bi-annual disclosures to the crowd-funding platform, which inter alia may contain audited financial statements, how funds raised were utilized and any other funding raised, among others.

Restrictions on each form of Equity-based Crowd-funding

Equity based Crowd-funding (EbC)

- Enables issuers to raise upto Rs 10 crore by issuing equity shares.
- No single investor shall hold more than 25% stake in a company.
- The promoter(s) shall be required to maintain a minimum of 5% equity stake in the company for at least 3 years.

Debt based Crowd-funding (DbC)

- Enables issuers to raise up to Rs 10 crores online by issuing debentures or debt securities.
- The debt securities issued should comply with requirements specified under Companies Act or rules made there under applicable to debentures or bonds.
- The issuer shall appoint a debenture trustee to hold the assets on behalf of the investors.
- The issuer shall need to create a Debenture Redemption Reserve (DRR) of 25% of the value of the debentures.

Fund based Crowd-funding (FbC)

- Funds of the accredited investors registered with a recognized platform will be collected online through the platform and pooled under the AIF to invest in shares or debt securities.
- Provide a separate class of funds under Category I AIFs to offer Fund based Crowd-funding as Category I AIF-Crowd Funds. The Crowd Funds can, post registration with SEBI, get displayed on any crowd-funding platform set up by either Class I or Class III entities. Funds may not be required to be subjected to the scrutiny of the Screening Committee of the platform.
- The minimum and maximum corpus of such funds would be Rs. 10 Crores and Rs. 25 Crores respectively.
- Such funds will be able to solicit funds online from a maximum of 1,000 accredited investors.
- Requirement of the minimum investment of Rs 1 Crore by every investor for an AIF is also proposed to be relaxed.
- All accredited investors viz. QIBs, Companies, HNIs and ERIs will be able to invest in these funds.

Who can Set Up a Crowd-funding Platform?

SEBI has proposed that any online offering or issue or sale through the internet can be made only through a SEBI recognized crowd-funding platform.

Class I entities

- Recognized Stock Exchanges with nationwide terminal presence (RSEs)
- SEBI registered Depositories

Class II Entities

- Technology Business Incubators (TBIs) Promoted by Central Government or any State Government through bodies such as NSTEDB (National Science & Technology Entrepreneurship Development Board) under Department of Science & Technology
- Functioning as a society registered under societies act of 1860/or as a non-profit making section 8 company,

– Having at least 5 years of experience,

– Having a minimum net worth of Rs 10 Crores

– Should have attained self-sufficiency

– Should display only those companies which share a common focus thrust areas as the TBI

A joint venture of a Class I entity and a Class II entity is also acceptable for setting up a Crowd-funding Platform as this would bring the best of both classes. To enable Fund based Crowd-funding (FbC), it is proposed that the new class of crowdfund AIFs be allowed to be displayed on the platforms launched by RSEs and depositories.

Class III Entities

Associations and Networks of PE or Angel Investors

– with a track record of a minimum of 3 years

– with a minimum member strength of 100 active members from the relevant industry

– which are registered as Section 8 companies under Companies Act 2013 with a paid up share capital of Rs. 2 Crores

SEBI also noted that platforms launched by Class I & Class III Entities can enable the FbC. It also noted that no entity can raise funds using crowd-funding without channeling their issues through a recognized crowd-funding platform, subject to the approval of Screening Committee.

Proposed Rules for Crowd-funding Platforms

Crowd-funding platforms must play the role of a gatekeeper and take reasonable measures to reduce the risk of frauds.

The proposed requirements for these crowd-funding platforms are:

• Conduct screening and basic due diligence of the business of the start-up. However, no amount of due diligence can provide any form of guarantee of the commercial success.

• Conduct background and regulatory checks on the issuers, whole time directors, promoters, shareholders holding more than 20% of equity shares in the company

• Review the information presented by the issuer on the portal's website to confirm that the information adequately sets out the general features and structure of the security, issuer-specific risks, parties involved, any identified conflicts of interest, and the intended use of funds.

• Conduct due diligence of investors such as net worth requirement and KYC requirement, if any, while maintaining the privacy of the investors.

• Deny access to an issuer if it has reason to believe that the issuer or its offering is fraudulent.

• Maintain a record of all the issues brought by the companies and subsequently the disclosures of the issuing companies and make it easily accessible to the investors.

• Collect and transmit information to SEBI as may be called for.

Rules for Setting Up Screening Committees

These committees will be in charge of vetting the issuer before it is listed on a crowd-funding platform. It may have a minimum of 10 people and may follow the following composition:

– At least 40% of the committee should be composed of professional with expertise in mentoring of startups and early stage ventures.

– At least 30% of the committee should be composed of professionals with experience in banking or capital markets.

– Not more than 30% of the committee should be composed of persons of high caliber and qualifications which are nominated by the owner of the crowd-funding portal, but not on its payrolls.

SEBI's role

SEBI's role in crowd-funding, which is proposed to provide a cost-effective and efficient method of fund-raising, will mainly be limited to:

• Recognition of the crowd-funding portals.

• Oversight and regulation of the crowd-funding market in India.

• Issuance of guidelines/circular regarding information required to be disclosed in Private Placement Offer Letter or on an ongoing basis or requirements of due diligence and screening or any other matter.

• Conduct of periodic inspections or audits of Crowd-funding Platforms and enforcement of Crowd-funding Regulations.

Conclusion

The crowd-funding style of funding is synonymous with normal human behaviour where when everything is hunky dory, the investors are happy but when the going gets slow, they blame lax regulations. In case of investments from other sources like private equity or venture capitalists, the investment mainly remains safe because of their command over the company's board and management but that is not the case with crowd-funding.

If there is any kind of default or fraud involved in crowd-funding, there's no protection provided to the retail investors because of the lack of paper work to prove anything. In case, the website through which the funding was raised closes suddenly, there's no way one can recover the money lost.

One of the objectives of the regulations is to reduce the costs involved in raising funds for entrepreneurs. Under the existing regulations, an issuer is required to pay underwriter fees, legal and accounting fees, registrar and transfer agent fees, merchant banker fees, marketing & advertising fees or distribution commissions and other fees some of which may not be applicable in crowd-funding. Crowd-funding facilitates such entrepreneurs in raising funds without incurring too much of the costs by doing away with the requirement of appointing a merchant banker, marketing & advertising expenses and book building etc. Further, there shall be no listing requirements and no prospectus needs be filed with SEBI. However, a company seeking display in recognized crowd-funding platform may be required to pay fees to such platform, which is expected to be substantially lower in comparison to the current issue expenditure. The fees to a platform may be dependent on various factors like number of platforms in the market, number of companies seeking display at such crowd-funding platforms etc.

PROGRAMME ON "MANAGING RISKS IN INTERNATIONAL TRADE WITH LETTERS OF CREDIT AND STANDBY LETTERS OF CREDIT & BANK PAYMENT OBLIGATION (BPO)"

Held on Thursday, the 21st January 2016 at Hotel Rang Sharda, Bandra West, Mumbai 400 099

PPMAI conducted a very informative programme on "Managing Risks in International Trade with Letters of Credit and Standby Letters of Credit & Bank Payment Obligation (BPO)" on Thursday the 21st January 2016 at Hotel Rang Sharda, Bandra West, Mumbai. This was a full day programme which was attended by 20 delegates from various industries.

Mr. K. Parameswaran was the Faculty for this programme who possesses four decades of experience as a banker and corporate advisor in structuring high value import letters of credit and he is currently a leading Consultant in the field of International Trade and Foreign Exchange. He handled all the issues related to Letters of Credit from various countries and banks and try to individually attend to various issues explained to the delegates how to solve them and finally how to collect early payment.

On conclusion of the presentation Secretary General thanked all the members who had sent their delegates to attend this programme inspite of the industry playing very low both in orders and cash on hand position. He also thanked all the delegates from the Industry for encouraging this program and asked them to continue their support to all PPMAI programs coming up in the future.

Faculty Mr. Parameswaran distributed the Certificate of Attendance to all the participants.

K. Parameswaran, Faculty conducting the workshop

Section of Audience

Faculty, K. Parameswaran handing over Certificate of Attendance to one of the delegates

Welcome NEW MEMBER

PPMAI welcome the following members who newly joined the association and look forward to their prolonged association and active participation in all our programs.

Sr. No.	Name of the company	Activity
1.	**TUBACEX INDIA PRIVATE LIMITED** 402 A, Block G, Platina, Bandra Kurla Complex, Bandra East, Mumbai – 400051 Tel : 022 – 40015300 Fax : 022 – 40015350 Email : info@tubacexindia.com www.tubacex.com **Mr. Ajay Sambrani** I *Director* Cell: 09820085427 **Mr. Vipul Sutaria** I *Director – Sales & Marketing, Asia* Cell: 9820019592	**Manufacturer of Seamless Stainless Tubes & Pipes in Austenitic, Duplex, Super Duplex & Nickel, Allays for:** OCTG & Umbilicals Tubing, Heat Exchanger Tubes, High Temperature Tubes & Pipes Instrumentation & Hydraulic Tubes, Line Pipes Boiler Tubes, Tubing, Piping & Felting for Nuclear Industry
2.	**LOGISTIC INTEGRATORS (I) PVT. LTD** A-604/605/606 – Sagar Tech Plaza, Sakinaka, A.K. Road, Andheri East, Mumbai – 400072 Tel : 022 – 4223 5555 Fax : 022 – 4223 5550 Email : sreenik022@logisticintegrators.com Web: www.logisticintegrators.com **Mr. Sunil Krishnan** I *Managing Director* **Mr. Sathish Madhavan** I *Director* **Mr. Sreenivasan V. Kurup** I *Sr. Vice President – Projects* Cell: 08080266816	**Freight Forwarding & Logistics:** Freight Forwarding Project Logistics, Customs Clearance and Inland Trucking
3.	**BEND-N-FAB ENGINEERING PVT. LTD.** Plot No. A-476 & A-316, TTC Industrial Area, MIDC., Mahape, Post – Ghansoli, Navi Mumbai – 400701 Tel : 022 – 27761437 / 1439 / 1472 Email : bendnfab@rediffmail.com; Bnfunit2@rediffmail.com Web: www.bendnfab.com **Mr. Chandrahas J. Shetty** I *Managing Director* **Mrs. Shobha C. Shetty** I *Director*	**Fabricators:** Fabrication of Heat Exchanger, Pressure Vessels, H.P & L.P. Heaters, Boiler Drums, Unit Tanks etc. Bending & Rolling of Plates: Plate rolling as per approved Drawing

Forthcoming PROGRAMS 2015

Welding of Low Alloy Chrome-Moly Steels	Feb 26th 2016
Mechanical Design of Heat Exchangers	March 2016
Tower Internals	
Inspection of Process Equipment	
Welding and NDT	
Thermal design of Shell and Tube Heat Exchanger	

ADVERTISEMENT **TARIFF**

PPMAI Speak Bi-Monthly Bulletin

Full Page Colour	Amount
Back Cover Outside / Inside	₹ 25,000.00
Inside Front Cover	₹ 25,000.00
Inside Full Page	₹ 20,000.00

Specification of our publication is as follows:

Period	: Bi-monthly
Print Size	: A-4
Print Process	: Offset 4 colour
Paper used for cover	: 170 gsm Sinarmass Coated Art Paper with matte lamination
Paper used for inside	: 130 gsm Sinarmass Coated Art Paper

Advt. Size Artwork should be A/4 size for full page advt. (210 mm width x 297 mm height). All advertisement will be in 4+4 cmyk Colours.

Payment:

- *Payment for banner advertisement should be made in advance by Cheque / DD in the favour of, "Process Plant and Machinery Association of India" payable at Mumbai along with release order*

PPMAI Website

Internet today has made the world small place and easily reachable nay it is the best and fastest medium to reach and access global markets. Airing advertisements on website is definitely an economical way to propagate your company and publicize your products world-over. Keeping this in mind, we have earmarked seven strips for advertisements on our website.

www.ppmai.org
gives you an opportunity to advertise worldwide

₹ 10,000/- per annum
(exclusive of service tax)

- The rate includes free link to your existing website
- The banner will be designed and provided by the advertiser as per specified size
- The banner will be in the form of JPEG or GIF file and its size will not exceed 20kB

We are pleased to inform you that PPMAI website www.ppmai.org is now fully revamped with new look and features.

Advertisers may modify their advertisement matter every quarter.

Payment:

- *Payment for banner advertisement should be made in advance by Cheque / DD in the favour of, "Process Plant and Machinery Association of India" payable at Mumbai along with release order*

PPMAI eSpeak Journal | soft copy (Published twice in a month)

₹ 10,000/- per annum
(Rupees : Ten Thousand per annum)

- Advertisers may change their advertisement matter every quarter
- The rates quoted are exclusive of service tax
- The size of the ad should be around 40 kb max. Logos or Images will not be entertained
- A format will be provided by PPMAI wherein the advertiser can furnish the advertisement matter

Payment:

- *Payment for banner advertisement should be made in advance by Cheque / DD in the favour of, "Process Plant and Machinery Association of India" payable at Mumbai along with release order*

PPMAI Newsletter | soft copy (Published twice in a month)

₹ 10,000/- per annum
(Rupees : Ten Thousand per annum)

- Advertisers may change their advertisement matter every quarter
- The rates quoted are exclusive of service tax.
- The size of the ad should be around 40 kb max. Logos or Images will not be entertained.
- A format will be provided by PPMAI wherein the advertiser can furnish the advertisement matter.

Payment:

- *Payment for banner advertisement should be made in advance by Cheque / DD in the favour of, "Process Plant and Machinery Association of India" payable at Mumbai along with release order*

For enquiries and queries contact :

Mr. V.P. Ramachandran, *Secretary General*
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