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WHERE KNOWLEDGE MEETS PRACTICE



Corporate HR – Learning & Development

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From the Editorial Team

On behalf of the Editorial Board, it is with great joy that I present to you the first issue of EXEMPLAR – Journal of Management and Leadership. The Journal, is yet another humble effort by Corporate HR – Learning & Development to further the cause of knowledge sharing and idea generation within L&T. EXEMPLAR is an attempt tap into the collective wisdom of L&Tites and provide them the opportunity to share their valuable learnings and insights in Management and Leadership, grounded in scholastic rigor with emphasis on practice and real-world implementation.

Traditionally, academics and practitioners have been pitted against each other by being placed on either side of an intellectual-practical spectrum. Bartunek and Rynes (2014) refer to this as the Academic – Practitioner Gap which is ever-growing and probably unresolvable (emphasis added). However, we do not see these two worlds as polar, opposite, or dichotomous. We see them as two lenses that can be blended together, enabling learners to apply high quality knowledge to diverse business situations and decision-making.

This prompts our managers to wear two hats (researcher and practitioner) at the same time, a valuable skill today. Our first paper, “Watching sports with a Hawk-eye: Management Lessons for an avid Sports Fan” by Sameer Godbole is a demonstration of this ability. The author brings together two seemingly divergent areas of his passion and profession by sharing his learning and reflections on what managers can learn from the world of Sports.

The second paper on the “Future of Process Plant Equipment Business” by Manali Barve and Rahulkumar Mali is an analysis of the business, social, and economic environment of India’s Process Plant Equipment industry. The article highlights the interplay between local and global factors and their impact on the business.

It is well established that our partners in business, specifically suppliers, have a direct and substantial impact on our performance. Our next paper, “Transitioning from L1 To B1 (Best One): An Alternative Holistic Approach to Supplier Selection” by Shamik Sanyal, is an exploration into the ways and means of optimizing the supplier selection process, one that considers multiple stakeholders interests, track record, and sustainability as a basis for selecting suppliers rather than cost alone.

In “Management Information System Aligned with Business Strategy & Key Performance Indicators,” authors Ayush Jain, Nilesh Mithapara, and Arivalagan Murugan emphasize the need for Management Information Systems to be more value-adding to the business by aligning it to both organizational and individual goals. The paper becomes increasingly relevant given the thrust on Digitalization within L&T and across the industry, in general.

Water, as a resource, is getting scarce and depleting fast. While this is worrisome, Venkatesh M N, in “Bathing Water: A Billion Dollar Industry” discusses a business opportunity emerging from this situation. The paper dwells on the possibility of converting (non-sewage) waste water into a sustainable and cost-effective source of fresh water for bathing and domestic use.

The penultimate paper by Kanishak Chopra, Hrushi Keshava Reddy, and Jerald Melwin throws light on the “Road Construction Industry in India: Issues and Way Forward.” Their report reveals the various factors affecting EPC/BOT Projects in the Road Construction Sector and tries to address the question of how to manage these factors to ensure timely, cost-effective, and quality delivery of such projects.

The entry of private players into the Defence Sector has raised a lot of eyebrows in both political and business circles. The seventh and final paper, “An Analysis of Strategic Partnership Model in the Indian Defence Sector” by Ajinkya Gaikwad and Deepak Chowdhary, reviews the Defence Procurement policies of 2013 and 2016 and presents their impact on the shipbuilding industry within the Defence manufacturing sector

Covering a wide range of subjects ranging from General Management to

MIS, and Bathing Water to Defence Procurement, the papers appearing in the first Edition of EXEMPLAR are a representation of the diversified presence of L&T in various industries. We are confident that every one of you readers will find something in the ensuing pages that appeals to your interests and presents new learnings and insights. It is also a pleasure to share most of the authors here made their debut research or academic writing with EXEMPLAR. This makes their effort and contribution all the more noteworthy. We heartily thank all the authors for their time and cooperation in bringing out this journal. Our gratitude extends to all the other authors whose work does not feature between these covers but have still done a commendable job by exploring the uncharted waters of Research and Scholastic Writing. We received 42 articles by over 70 authors from various functions, levels, and businesses of L&T. It was heartening to see the willingness of all these individuals to participate in this initiative to share knowledge, and to learn and grow together. This is a strong testimony

to L&T's culture as a Learning Organization.

Equally important to the success of this journal is our panel of esteemed reviewers who not only made time for reviewing these articles, but have contributed to their improvement as well. We have benefitted significantly from their knowledge and expertise of the various topics covered here.

Our colleagues from the Corporate Brand Management and Communications have been an invaluable partner in our journey to create this journal. They have been extremely supportive of this initiative from christening the Journal, to designing, and publicising it.

We conducted multiple Webinars to orient aspiring authors towards the nuances of academic writing. Prof. Srinath Jagannathan of the Indian Institute of Management – Indore, deserves a special mention and our gratitude for his webinar on “Research for Business Managers,” which was attended by over 50 participants and

gave everyone some very valuable inputs on the art and science of scholastic writing.

Finally, our thanks to L&T's leadership, including Mr. Yogi Sriram, Senior Vice President – HR & Member of the Executive Committee, Mr. B.S. Saluja, Head, Corporate Learning & Development, and Dr. Swatee Sarangi, Head – Capability Development, for their support, guidance, and the freedom they gave us in envisioning and executing this initiative.

The birth of a new journal comes from a long process involving a lot of collaboration. We are relying on the combined efforts of all our Editors, reviewers and contributors to make it a contemporary, lively and relevant publication.

We hope you will enjoy reading the first issue of EXEMPLAR.
Happy Learning to all of you.

Anush Mohan,
Corporate HR – Learning & Development

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WATCHING SPORTS WITH A 'HAWK-EYE'- MANAGEMENT LESSONS FOR AN AVID SPORTS FAN

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Abstract

As an avid sports fan, over the years, the author has realised that there is more to sport than just excitement and entertainment. Individuals and teams in sport achieve exemplary feats by practicing excellence. Strategy, teamwork, are leadership are not provinces of business alone. The writer believes we don't take some of the sporting achievements in these areas as seriously as they deserve. The notion of finding a parallel in sport to draw lessons for what we practice in the business world is not very widely accepted yet. This essay urges the reader to take sport more seriously and look for virtues and behaviours that can be emulated to evolve as better professionals or organisations. The idea is to observe (and not just watch) sport and learn through metaphorical thinking.

This aspect of sport has been dealt with by many a management expert in the past. However, this essay presents a manager's perspective on the subject gathered from spending an incredible amount of time watching sport and at very weird hours at times, as a fan.

Introduction

Is 'excellence' confined to the realm of corporate pursuits? Are 'leadership' skills

on display just in the board rooms? Do the best 'teamwork' examples get set exclusively in the field of business? Is 'strategy' vital for corporate success alone? Are the virtues of commitment, passion, drive, creativity, innovation, accountability, integrity and ethics entirely the provinces of Corporate HR functions?

Or ... Can corporations and managers also seek inspiration from other domains? The answer is an emphatic 'Yes'

The precision and Riyaz (practice) in music, creativity and discipline in theatre, strategy and teamwork in sport, perseverance and improvisation of a screenplay writer, the vision of a cinematographer, and dedication of a singer all have valuable lessons to offer – if one is looking for them Sport is one such domain - a 'best fit' for business thinking.

Each sport operates in a highly competitive and performance driven environment. Be it individual sport or a team sport, the goal is to 'win'. To outperform competition each time..

Leaders in sport are as capable in developing teams and driving performance as their counterparts in the business world. Sport has set some remarkable examples of team work which has led to sustained success.

The stakes are higher in sport. In sport the player is only as good as his or her last performance. Unlike corporations, sportspersons cannot afford to have 'a bad day at office'. A single failure and one is either out of the team or knocked out of the championship as a team. Success or failure in sport determines life chances for the sportspersons. Naturally, there are valuable lessons to be drawn from sportspersons or teams who have been highly successful. Stories of successes and failures in the field of sport have many a lesson to teach the managers and corporate citizens.

We have several examples where sport has borrowed from management. FC Barcelona¹ implemented a virtuous circle, a well-known business model into the sport domain to become the best football team of the world in 2009. Tennis coaches have used 'six sigma' strategies to improve the coaching and training of players to the point where they reach their maximum potential ability. If board room strategies can be applied on the field of play why not the reverse?

Past few decades have showcased some of the best sporting talent. Roger Federer, Michael Jordan, Usain Bolt, Michael Phelps, Tiger Woods, Diego Maradona, Muhammad Ali, Jack Nicklaus, Sachin Tendulkar, Michael Schumacher, Steffi Graf, Wayne

Notes:

¹ FC Barcelona is a professional football club in Barcelona, Spain (commonly known as 'Barça')

Gretzky,. Lionel Messi, Cristiano Ronaldo and many more, weren't born as champions

Similarly F C Barcelona, F C Bayern Munich, McLaren and Mercedes Formula 1 teams, Boston Celtics, Chicago bulls, New York Yankees, West Indies Cricket team (80's / 90's), Australian Cricket team, Brazil and German football teams, and the New Zealand Rugby team amongst many others have set great examples of team work.

The dynamics in a team sport differ significantly from that in an individual sport and therefore their offerings in terms of lessons for business too would vary. In the end, both teach to 'win'. Both forms share a large number of attributes that are required to succeed. However, what it takes to win a Wimbledon or to become the fastest man in the world² can significantly differ from what it takes to win a UEFA Champions League³ or a Cricket World Cup. While watching Roger Federer on the Centre Court what one sees is excellence achieved through perseverance, passion, creativity, innovation, work ethic - qualities that build individual character. On the other hand, if one is sitting at the Allianz Arena with Bayern Munich scoring their way to glory in the Bundesliga⁴ what is on display is an excellent example in leadership, strategy, communication, trust, common purpose and discipline – qualities that create high performance teams. Certain examples in sport can also act as a negative reinforcement urging the observer to strengthen certain behaviours.

In the paragraphs to follow, this essay shall use certain sporting metaphors, analogies and illustrations to help reader see the value proposition.

Strategy

What is the one thing that organizations of today cannot survive without – A Strategy. Every business needs a 'clear' strategy to succeed. Millions of dollars are being spent by organizations to get their strategies right. Strategy is a complex term to define and comprehend in the context of business particularly because more often than not, strategy is mistaken for steps or actions that lead to

strategy. Let us use a very easy to understand yet accurate definition of the term offered by Michael Porter – Strategy is recognizing the unique position that a business needs to achieve and identifying its competitive advantages which will help it to reach that position. Strategy is about being unique, gaining competitive advantage and sustaining the advantage. Businesses have to constantly compete, sustain the competitive environment and they need to keep winning. Switch the landscape from business market environment to the field of sport and the reader would be thrilled to see that sport offers some very relevant lessons in strategy.

World of sport is flush with stories of how strategies have helped teams and individuals succeed at the highest level. Every sportsperson or team invariably works to a strategy. However, there is a finer distinction when it comes to strategy as one understands it in the context of business thinking as opposed to how it is perceived in sport. Sport relies heavily on strategy and tactics. These two combine to form a 'Strategy' for sport, as it is understood in conventional terms. In sport, strategy is generally an overall plan to achieve the ultimate goal which is normally long term or for a particular season or a series or a tournament. Tactics on the other hand are a series of short term decisions that are taken during games to suit a particular situation. Tactics often complement strategy in pursuit of an ultimate goal.

A 4-4-2 formation can be a strategy for a whole season by a football team. However, depending on the way a game has progressed, the team can use the tactic of using a sweeper⁵ for part of a game.

Total Football

Total football is one of the most revolutionary strategies in the history of football. It completely changed the way football was played at the time and gave an unassailable competitive edge to the teams that adopted this strategy. Dutch club, Ajax, under captain Johan Cruyff and manager Michels, mastered this tactic, helping them win the European cup for three consecutive years and taking the Dutch football team to a

World Cup final. The essence of this strategy is to build versatility in the team where every player is capable of taking on the role of every other player with the exception of the goalkeeper. For example, if a striker moved on the far side, a midfielder would move to the centre and take the place of a striker. Constant interchange between players made the team unpredictable and at the same time gave tremendous speed due to continuous ball movement. This foxed opponents who were used to the man marking style being played at the time and had no answer to the unpredictability brought about by Total Football. This strategy was as an exciting response and antidote to the then prevailing and seemingly unbeatable Catenaccio system of play which relied on strong defence through man-marking to neutralize the opponents' attacks. In later years, as a coach of the Spanish club F C Barcelona, Cruyff deployed the fluidity of this strategy to win four Spanish titles in a row and the Champions League.

This strategy brought elements of agility, flexibility, versatility to the teams and made them mighty effective. The best thing that this strategy did was to make the players stop thinking of the bounds of their roles and instead focus on scoring and creating opportunities to win games. This attack oriented strategy did wonders and was one of the most impressive innovations the game has ever seen.

Notes:

² Winner of the 100 m sprint race at the Olympics is often named as "the fastest man in the world"

³ The UEFA Champions League is an annual continental club football competition organised by the Union of European Football Associations(UEFA) and contested by top-division European clubs

⁴ The Bundesliga is a professional association football league in Germany and the football league with the highest average stadium attendance worldwide.

⁵ Sweeper is a fluid position often used to support the defence and also take the ball forward to midfield

Formula 1 Race Strategy

There are few things in life as thrilling as watching a live Formula 1 race. Those who crib about the speed and dynamism of the business world should take a peek into the high speed and even higher pressure environment of Formula 1 (or F1) racing. F1 racing is not just about the drivers in those sexy machines that they drive around the race track, it is a race in technology, innovation, high performance, research, preparation and above all, strategy. All of these have a great impact in ensuring that the drivers skills on track are complemented and enhanced to keep him ahead of the pack.

Like in markets, race teams have to operate within a stringent framework of rules and regulations. Rules which can often change dramatically. Challenges in F1 racing start with the variety of tracks. Tracks like Silverstone are specially designed and built for racing, Singapore and Monaco are street racing tracks and then there are the hybrid tracks. Each circuit will offer unique conditions of run-off areas⁶, visibility, lengthy straights for overtaking, corner types⁷ and surface of the tracks. The 'rules of the game' keep changing and have a profound impact on the way team strategies are shaped.

Refuelling⁸ during the race is one area which has been allowed and then disallowed over the years. This forced a change in strategy of race teams who earlier relied on racing light to gain speed and making 2-3 stops in a race to refuel.

The move to allowing only a single supplier of tyre forced strategies to be realigned by teams who relied The move to allowing only a single supplier of tyre forced strategies to be realigned by teams who relied on their make of rubber. Even recently the use of number of internal combustion engines was restricted to three rather than four for one full season. With high competition, a strong regulator⁹, varying conditions at different racing circuits, and technology disruptions, racing teams are forced to constantly evolve innovative strategies.

- In the French Grand Prix of 2004 at the Circuit de Nevers Magny-Cours, Fernando Alonso took the pole position in his Renault car after having beaten Michael Schumacher by 0.273 seconds in the qualifiers the previous day. Overtaking is extremely tough on the French track even for someone like

Schumacher who is known to record some of the fastest lap timings on the racing circuit. Schumacher and his Ferrari team realised, much ahead of the race, the need to change the team strategy. The team did not pursue its routine race plan and chose a four pit-stop strategy instead. With low fuel loads, which became possible by increasing the number of pit stops to refuel, Schumacher clocked some amazing speeds and made the chequered flag eight seconds ahead of the bewildered Alonso.

- As a response to the restriction of using only three engines for the full 2018 season, Team Renault have already hinted a strategy of factoring in the grid penalties resulting from non-compliance with this rule rather than sacrificing engine performance required to make them last longer. Whereas teams like Mercedes do not see this as a major change as they claim to be already geared up in anticipation of this change.

- Cases like the Kinetic Energy Recovery System (KERS)¹⁰ in 2009 is a classic example to demonstrate the pitfalls of embracing new innovations too quickly to get the first mover advantage. KERS helped gain speed but also added weight to the car. Most of the F1 teams who jumped into this innovation did not win races and eventually waved goodbye to this innovation. Teams who were cautious and focused more on improving what they were good at ended up with a podium finish on most occasions.

- Different defensive and offensive strategies in basketball, the opening gambit by Sri Lanka in 1996 cricket world cup, neutral zone trap strategy¹¹ in ice hockey, a high percentage tennis singles strategy, a false 9 or tiki taka style in football and many more such examples from different sport will demonstrate how sport teams employ effective strategies to 'win'.

Sport is one domain which has embraced technology as a duck takes to water. Technology has become an inherent and integral part of strategy in sport. Be it the DRS in cricket, Power meters in Cycling, GPS sensors in rugby and football, use of Aero Dynamics and Hydrodynamics in clothing design to minimise air or water resistance and gain speed for the athletes, application of data analytics across an array of sports, as also the drug testing technologies implemented by WADA (World Anti-Doping Agency), are pointers to how sport has recognised contribution of technology in improving competitiveness.

Managers can derive principles and deduce inferences from numerous such case studies provided by sport to shape their business strategies. Total football drives home the impact of a game changing strategy where competitors are taken by surprise by moving away from the convention and being innovative. It shows how one can win when 'one doesn't play the opposition's game' but creates a completely new playing field with newer rules. By the time the competition can react to such a strategy one has already gained a unassailable lead. The importance of constantly thinking differently can help business to evolve some unique competencies. Through this strategy Cruyff also teaches us how businesses too can succeed by increasing the 'versatility' quotient of the team.

Formula 1 is a perfect example of how organisations can respond to the demands of a high speed and highly competitive environment of business. Organisations seldom tend to focus on one or two major areas to maximise gains in market while ignoring a few other essential components often leading to undesired outcomes. It can show the way to organisations in appreciating that there are multiple facets of performance which need to be simultaneously controlled and improved in order to achieve success. Some of

Notes:

⁶Run off area is an area on a racetrack for racer safety. Better run offs allow racers to push the limits.

⁷Tracks offer variety of corners (turns) – Fast sweeps, hairpins, medium-speed, left and rights.

⁸Refueling during the race allows the racers to run the race lighter with lower fuel and thereby gain speed.

⁹Formula 1 racing is governed by Federation Internationale de l'Automobile (FIA)

¹⁰ A kinetic energy recovery system (KERS) is an automotive system for recovering a moving vehicle's kinetic energy under braking. The recovered energy is stored in a reservoir (for example a flywheel or high voltage batteries) for later use under acceleration.

¹¹Neutral Zone Trap is a defensive strategy in ice hockey to prevent the opposing team from proceeding through the neutral zone

these examples also demonstrate that with the right mix of caution and aggression, innovation and convention, businesses can win over the dynamic nature of markets where rules of the game change too often. The KERS example clearly depicts that business should also look at maximising strengths rather than solely focussing on weakness or embracing new innovations alone.

Teamwork

“Play for the name on the front of the shirt, and they will remember the name on the back”

-Tony Adams (English Football Manager)

There is nothing as valuable as a high-performance team in a competitive environment where competitive advantage seems to be coming more and more from the quality of the team rather than any other resource. A business may have best of strategies and more than adequate economic resources and yet it can never succeed unless it has a set of high performance individuals who believe in teamwork. Performance of a business is a function of what its team achieve.

A real team, compelling direction, enabling structure, supportive context and competent coaching are the five conditions, when present, increase the effectiveness of teams (Hackman, 2002). It can be a matter of debate as to who relies more on teamwork to achieve success – business or sport? The Java development team at Sun Microsystems, team at Ford Motor company, the Google team are some of the brilliant examples of team work in the world of business. It gets better with sport.

One of the joys of watching sport is seeing teams combine and win championships. The camaraderie, trust and bonding on and off the field is a treat to watch. High awareness and focus, clarity of purpose, flexibility in approach, selfless attitudes, ability to enjoy each other's success and most importantly the spectacular things they achieve together are worthy of emulation in the business domain.

Teamwork is one skill which sport can undoubtedly teach the world of business.

•The greatest underdog story ever in the history of English football is perhaps that of Leicester City winning the Barclays Premier League title in 2015/16. After having barely managed to avoid relegation¹² in the previous year, Leicester City were once again tipped to be one of the candidates for relegation candidates at the beginning of the 2015/16 season. The bookmakers had them at an incredible 5000-1 odds to win the League title. Leicester City is one of the most unglamorous teams in English football and had never won a title in their 132 years of playing history. And yet with a ‘nobody’ side, a little known manager and a very simplistic style of football they sprung a miracle to the horror of some bigwigs like the Manchester United, Chelsea, Liverpool and Arsenal.

One of the many things that they did right that season under the leadership of their manager, Claudio Ranieri, was to have clarity of purpose and discipline. One wouldn't find a Leicester player stuck with possession for long, he would knock the ball off. The team consistently maintained discipline in defence and remained adroit in their attack. As one of the opponent team's manager put it, “What Claudio is doing is amazing: everyone knows how his team plays but no one can stop them”. Claudio's strategy to give small targets at each step to his team played a vital role in the team's successes. In one of the games Claudio promised his players a pizza every time they succeeded in holding their opponents scoreless. He not only fulfilled his promise but also ran the scheme throughout the season.

If one observes how the team maintained their rhythm through the season, it would reveal that some of the secrets of their success were strategy, adaptability and pursuit of a common goal with complete clarity. In matches such as the one against the title favourites Manchester City, contrary to everyone's expectation (including Manchester City players) that Leicester would play conservatively to secure a tie, they began aggressively scoring in early minutes of play to eventually beat City by 3-1. In some other games, they were astute and played defensively.

Watching Leicester City play in 2015/16 was a fairy tale experience. After a long time, one could see the ‘joy’ of playing on the faces of each team member. It was so very evident that they were

enjoying every moment of it. Leicester City reinforced the importance of teamwork in a modern era where acquiring best players by paying top dollars is seen as the only means to winning championships.

To the non-soccer fraternity, it would not be possible to comprehend the apparent farcicality of what Leicester City had accomplished. Nevertheless, it was nothing short of a miracle achieved through excellence in teamwork.

To Business leaders, the Leicester underdog story is a hard blow to the popular belief that acquiring top talent from high profile B-Schools is a sure or perhaps the only way to success. Clarity of goals, versatility, discipline and consistency of the team are areas that need bigger focus. If businesses get some of these pieces right they can build sustainable models for success.

•A very recent example of selfless team play came from a La Liga encounter between Real Madrid and Alaves. Cristiano Ronaldo was on the verge of the 50th hatrick of his career when Real Madrid won a penalty. Ronaldo was always the obvious choice to take the penalty. Had he taken it not only would he have got his hatrick but would also have become the second player ever to net 300 La Liga goals after Messi. And yet Ronaldo offered this opportunity to Karim Benzema only to lift his team mate who had faced severe criticism for not having performed and found the back of the net only thrice during the season. Benzema scored.

•Rowing is another example of what it takes to win as a team. As one watches a rowing race, he or she will realise that teamwork accounts as much as the physical attributes and the sporting skills in order to win.

Notes:

¹² The bottom three teams in the Barclays Premier league are relegated to lower level.

¹³ Pit stop is where a racing vehicle stops in the pits during a race for repairs, adjustments, new tyres etc.

One of the keys to success in rowing is about collaboration and synchronised efforts - working in unison. Rowing indeed requires immense physical strength but what it also takes is one rower to combine with the other and move precisely in the same way as a team. Rowing is not about one brilliant individual performance that could take the team home but is only about how well the team synchronises. These high levels of synchronisation are only achieved through camaraderie, close bonding, trust, commitment and selflessness.

Australian rowing team 'Oarsome foursome' in the Atlanta games finished the semi-finals in third place and based on their form were not tipped to defend their title this time around. Coach Donaldson clearly attributed their lack of form to the egos of team members which prevented them from giving their best as a team and that they were actually working at odds against each other. Donaldson went back to the drawing board with the basic virtues of teamwork. He actually drew pictures of four magnets polarising apart and the same four magnets attracting, to drive his point home. He made each member of the team tell one another one defining thing that he would commit to do for the team and one thing they would demand from the other. The result was 'gold'(en).

Apart from these, one very important principle that sport establishes very emphatically is that teamwork is not about individual brilliance. Winning championships is about how members of the team perform together rather than individually. Too many stars in a team may, at times, pull down performance. Real Madrid football team can be a very good case study in this regard. A research by Roderic Swaab and his colleagues (2014) inferred that basketball and soccer teams with a high percentage of star performers actually performed worse than those with moderate presence of top talents.

Like the Leicester City team, teams with moderate performers focus more on

discipline and teamwork than relying solely on individual brilliance.

Business teams largely remain adversarial. Some of the examples above are undisputed testimonies that teams who collaborate better are the ones who lift more trophies. Businesses can take a leaf out of the sport's book to build high performance teams through collaboration, trust and selfless behaviour. The consequences of a great team work or the opposite are as dire in business as in sport, if not more.

Leadership

Leadership means different things to different people. Creating an inspiring vision, building high performance teams, setting the direction, creating a road map and motivating teams to deliver the vision could together define leadership. In the words of Dwight Eisenhower, **"Leadership is the art of getting someone else to do something you want done because he wants to do it"**. Leadership is a tough act. A leader most essentially has to be multifarious. .

He or she does not only have to lead from the front by example but also do a variety of other things – upgrade the team, people embrace their vision, create positive energy, establish trust, make unpopular decisions, inspire risk taking, probe and also celebrate (Jack Welch, Suzy Welch, 2009). We have several examples across the globe on leaders who have inspired companies to achieve fantastic feats and also a few where lack of right leadership have taken companies over the cliff.

Vince Lombardi, one of the greatest NFL coaches (National Football League) said "Leaders are not born, they are made". He believed that leaders are made out of extreme sacrifice and hard effort that are required to achieve a worthy goal. Sport believes firmly in this maxim. Some of the best leadership examples can be found in the field of sport.

Franz Beckenbauer (Captain of German and Bayern Munich Football team), Ray Lewis (American Footballer), Richie

Benaud and Ian Chappell (Australia Cricket team), Bobby Moore (Captain of the England and West Ham United football teams), Michael Jordan (Chicago Bulls, NBA), Martin Johnson (British and Irish Lions and England, rugby union), Steve Yzerman (Detroit Red Wings, NHL), Tim Duncan (San Antonio Spurs, NBA) and Diego Maradona (Argentina Football team) are some legendary sports leaders whose stories can provide immense insights in to the world of leadership. If the author has to define 'what did these leaders lead by' in one word, it would look something like this:

Beckenbauer: Inspiration
Ray Lewis: Preparation
Richie Benaud: Teamwork
Ian Chappell: Respect
Bobby Moore: Courage
Michael Jordan: Trust
Martin Johnson: Self Belief
Steve Yzerman: Resilience
Tim Duncan: Selflessness
Diego Maradona: Performance

A mere peek into the resume of these leaders would provide the reader with a lot of raw material to manufacture leaders. In sport in particular, because the results are undisputed, 'cover your backside' strategy is unavailable. Resultantly, the accountability quotient is very high. A recent example of Gautam Gambhir leaving himself out of the Delhi Daredevils IPL Cricket team is an example of accountability in sport. The high pressure and high competition environment of sport nurtures and grooms leaders as well as any other system. To see leadership in practice on a playfield can render a more profound impact than reading textbooks on leadership. Whether one is a coach, captain or a manager of any team, leadership is of immense importance in sport.

- The extraordinary achievement by Portugal when they won the Euro 2016¹⁴ Finals against the hosts and favourites France was a great example in leadership. Inside 25 minutes of the first half Cristiano Ronaldo (Captain and Star player of the Portugal football team) was forced off the field due to a knee injury. He left the and he was also aware of the impact his departure would have on the morale of the team.

Notes:

¹⁴ UEFA European Championship is a quadrennial international men's football championship of Europe.

However, he not only gave a pep talk to his players during half time motivating them to fight as one and emerge stronger, but also came out with a strapped knee in the second half and kept limping along the side lines shouting and rooting for his mates. Portugal went on to win the game and its first European championship ever. In fact, this was the first time Portugal ever won a major tournament. Scenes of Cristiano celebrating with his team mates that night at the Stade de France were a sight to behold. A lot of his team mates later on acknowledged Cristiano's leadership to be one of the vital factors in the victory

- A no-holds-barred speech by Beckenbaur after West Germany lost to East Germany in a World Cup game to lift the team morale and to identify underachieving players and then to recalibrate the strategy and line-ups for future games did wonders to the team. The result was a World Cup win.

- Anil Kumble, a leading spin bowler in the Indian team, suffered from a serious injury to his jaw which eventually required a surgery. However, he showed up on the ground with his jaw strapped and also took the prized scalp of Brian Lara (great West Indies batsman). This was one of the bravest things ever seen on a cricket field.

Very rarely in sport does one see 'leadership through inheritance' or by any criteria other than performance and ability to lead. Leaders in sport, who are regarded as highly successful and persisted with, are the ones who are found to be good at inspiring teams to achieve extra ordinary results and not because of their individual brilliance alone. Sachin Tendulkar's (short) stint as the captain of Indian cricket team is a good case in point.

Leadership in sport is not just about the ability to lead men and women. It is also about character. A leader in sport has to be very good as a player himself or herself and *then* should also have the leadership abilities. First the sportsperson has to get picked in the team on the basis of his or her sporting abilities. In sport, like in most other domains, leadership skills are not always a prerogative of 'captains' alone. Sports persons per se practice excellence in

many of the qualities that build character.

Leadership in business is no different than its counterpart in sport. The passion to succeed, the desire to create followers and leave a legacy is no less in business. The ability of some of the leaders like Maradona to lead ordinary teams to glory is worth emulating.

Leadership traits in sport such as - leading by example, building trust, striving to help others succeed are off the shelf pick-ups for business leaders. A growing trait in business leaders, which they can move away from by observing sport, is to exercise authority from the position of power. This is a sure path to misalignment and failure. Sports leaders on the other hand believe in leading through consensus on a common vision. It is about gaining acceptance more out of respect than sheer authority.

Another point of difference (and hence something which business can borrow) between sport and business is teams in sport can actually see their leaders practice his or her skills in a game. In business, leadership is largely confined to review meetings or strategy sessions where the teams witness their leader more as a preacher than a practitioner of his or her craft. It will help business leaders build credibility by finding avenues to demonstrate their skills in front of their teams.

The accountability example of Gautam Gambhir is very rarely seen in the field of business. In sport, leaders face the brunt of failures. M S Dhoni is not often seen in the centre of a team picture lifting the trophy after winning a major tournament. He would rather be lurking somewhere in the back. Both these examples talk volumes about leadership as it is practiced in sport. The author has seldom seen team photos or photos of some key employee on the cover of a business magazine. Something to ponder about?

Work Ethic

In sport, greatness cannot be achieved without relentless hard work. Legendary golfer Gary Player once said, "The more I practice the luckier I get". The importance of work ethic in sport cannot be overemphasized. Talent alone, without a good work ethic, cannot guarantee success in sport.

- The exceptional work ethic of Jerry Rice made him one of the greatest 'receivers'

in the history of NFL. He would practice long hours even after the entire team had left the practice ground, maintained a remarkable work-out regimen in off-season, ran 5 miles hill trails, did extremely strenuous weight training and commenced his practice drills months before the season would actually start. Rice did it with unwavering consistency to finally achieve a level of excellence in his sport.

- Virat Kohli, captain of the Indian Cricket team, is known to follow a rigorous work ethic. His fitness and diet regime is a topic of discussion in sporting circles. As his team mate Cheteshwar Pujara acknowledges, "What he does is remarkable. It is very difficult for anyone to be so consistent and still get up every single morning and do the same thing again and again". Incidentally Virat Kohli draws his inspiration from Cristiano Ronaldo whom he regards as one of the most hardworking footballers in the world.

Resilience

Resilience is one quality which is not a regular part of any corporate soft skill training program. And yet it is extremely vital for organisations to acquire a resilient character today. Resilience can be described as one of the most essential qualities that a sportsperson needs to possess. The pendulum between success and failure can swing more vociferously and frequently in sport than in any other domain. Needless to say, a sportsperson should have developed the quality of resilience to be able to bounce back each time he or she is knocked down.

- Roger Federer winning the Australian Open in January 2017 against Rafael Nadal to claim a grand slam title after a drought of five years was resilience personified. The 18th grand slam title kept eluding Federer due to injuries and lack of form. Obituaries to his playing career were already flashing in the media. His fans also began doubting if he would ever win a grand slam again. Not only did Federer win the title in 2017 but went on to add two more to his kitty including the Australian Open in 2018.

- Yet another illustration of bounce-back-ability in sport is Team India's win over Australia in the second cricket test match at Eden Gardens Calcutta. Indian team folded up for a meagre 171 all out in their first innings conceding a massive lead of 274 runs to Australia. Indians

had to follow-on¹⁵. What actually followed was nothing short of a miracle. With their backs to the wall, Indian team bounced back to score 657 runs and declared the innings leaving Australia a target of 383 runs to win the test match. On the last day of the 5 day test match Australia were all out for 212 and India had won the game by 171 runs. V S Laxman's knock of 281 runs and his partnership of 376 runs with Rahul Dravid (who scored 180 himself) was arguably the best ever batting display in the history of the game. The story of this test match is one of the fairy tales of Indian Cricket.

- **Commonwealth Games 2018** saw Indian Shuttler Saina Nehwal comeback after a disappointing show in the Rio Olympics and a spate of injuries that held her back. The Indian media was quick to draw conclusions on her playing career. She finally won the Gold medal in Women Singles badminton at the games. This win was a well-deserved outcome for her fighting spirit and strong desire to come back on the podium.

If one observes closely, the natural response of a sportsperson to any difficult situation in his or her trade is better calibrated than that of their counterparts in other domains. Like teamwork, resilience is one area in which sport can be a great teacher.

Very seldom we see in the business world that companies which suffer a set-back bounce back with self-belief and a vigour to succeed. Most failed companies continue to remain buried. Sporting lessons in this area can be extremely useful for companies to regain that self-belief.

Preparation

There are no windfalls in sport. Each achievement in sport is as much a result of preparation as much as it is of skills and talent. Anson Dorrance, an American Soccer coach says "The vision of a champion is bent over, drenched in sweat, at the point of exhaustion, when nobody else is watching".

- **Weeks before the race**, Formula 1 drivers have to start preparing to achieve desired fitness levels. In racing, drivers have to carefully calibrate the mix of strength, weight and endurance. They undergo intense cardio training to keep the body lean and simultaneously do weight training to gain strength that is required to meet the rigor of F1 racing. They also have to take into account how the race car is built to decide on their

fitness levels. The drivers also focus on their nutrition and plan dietary regimes in advance. Special efforts are taken to acclimatise with the ambient conditions on the racing circuit. Michael Schumacher is said to have followed one of the most grueling routines to improve his physical strength, reaction time and coordination. No wonder, he is one of the most successful Formula 1 drivers.

- **An excerpt from Novak Djokovic's book 'Serve to Win' (2013)** – "How much discipline? In January 2012, I beat Nadal in the finals of the Australian Open. The match lasted five hours and fifty three minutes – the longest match in Australian Open history, and the longest Grand Slam singles final in the Open Era. Many commentators have called that match the single greatest tennis match of all time. After I won, I sat in the locker room in Melbourne. I wanted one thing: to taste chocolate. I hadn't tasted it since the summer of 2010. Miljan brought me a candy bar. I broke off one square – one tiny square – and popped it into my mouth, let it melt on my tongue. That was all I would allow myself. That is what it has taken to get to number one."

Passion

Skill and fitness can be acquired. Not passion.

In sport, passion can differentiate the great from the good. Champions who are driven by passion choose to take immense amount of effort on perfecting every craft of the trade.

- **Michael Phelps suffered from Attention Deficit Hyperactivity Disorder** as a kid. ADHD makes the kid highly impulsive, disorganized and hyperactive. The silver lining is people suffering from this disorder can be hyper focused while doing things that they love. Phelps channeled his energies on his passion – swimming. In Phelps's words "Nobody is going to put a limit on what I'm doing". He chased his passion for over 16 years through rigorous effort and won record 28 Olympic medals (23 gold) and 83 medals in all (66 gold). He won 8 gold medals in 2008 Beijing games which also stands as a record to his name. It was his passion which saw him swim in 5 Olympics.

- **If it was only for fame, money or records** Sachin Tendulkar could have retired at a young age as he had accomplished all of this much early in his career. But it was his passion and love for the game that pushed him to play the sport and represent his country for

over 24 years and reach an unprecedented landmark of 100 centuries.

- **Mary Kom is passion personified.** Despite several obstacles and breaks in her career she always found ways to return to her passion – boxing. Despite a modest back ground and having to play the role of a daughter, wife and mother she has to her credit six world boxing championships, five Asian Women Boxing championships, one commonwealth gold, one Asian Games gold and other gold, silver and bronze medals in her boxing career which spans over 18 years.

The stories of sportspersons converting their passion into medals and championship wins through sheer determination, hard work and discipline can act as a source of motivation for thousands of business professionals. Foremost, the reader can appreciate the need to be passionate about what he or she does, to be able to achieve excellence and second acknowledge the immense effort that is needed to be put in to convert passion into success.

Conclusion

We all need to acknowledge that there exists excellence outside our domain of expertise. It may neither be ignominious nor too extravagant to accept that that there indeed are learnings in other domains such as sport, art and music. In fact, it would do a world of good if we are able to pick everything that is useful and add to our repertoire.

Learning from Sport does not have to go the whole nine yards. It would be inappropriate to even suggest that one can manage an organisation like a competitive sport as it would lead to undesirable outcomes. In fact, it is necessary to separate a signal from the noise by focusing only on those areas in the sporting world which have a relevance and a constructive application to what one does at the workplace.

Something that would help the reader become a better professional or a better team.

Notes:

¹⁵ In the Test Match format in Cricket, if the team batting second (Team B) scores 200 runs less than the team batting first (Team A), Team A can then ask Team B to 'follow-on' i.e. to bat once again. If the team B still fails to surpass the score of Team A, then team A wins

The proposition in this essay is certainly not to make the reader take a baseball bat or a football to work. Instead, the purpose is to urge to look at sport not merely as a means of entertainment but also as a source of inspiration and

learning. It is to add a perspective to the way sport is watched. To help draw inferences and be able to derive learnings while watching sport relating to his or her own work area. The author firmly

believes that sport provides many valuable insights on how business and professionals can conduct themselves, only if one watches it with a 'hawk-eye'.

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FUTURE OF PROCESS PLANT EQUIPMENT BUSINESS

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Abstract

The Process Plant Equipment (PPE) business in the oil & gas, fertilizers, and petrochemical segment is largely dependent on the crude oil prices. Over the last decade, crude oil prices had seen a significant fall from \$140 per barrel in Apr 2008 to \$33 per Barrel in Feb 2016 causing a slowdown in the PPE industry. However, in the last two years, the crude oil prices are seen to be rising and the industry is again gaining traction. On the other hand, the new government policies such as localization & government funding, new technologies - alternative fuels, electric vehicles, digitalization,

metallurgy continue to influence the business sector. In this research paper, we make an attempt to understand and present the trends based on expert opinions on these factors that influence the process plant equipment business, and summarize our view on the business prospects.

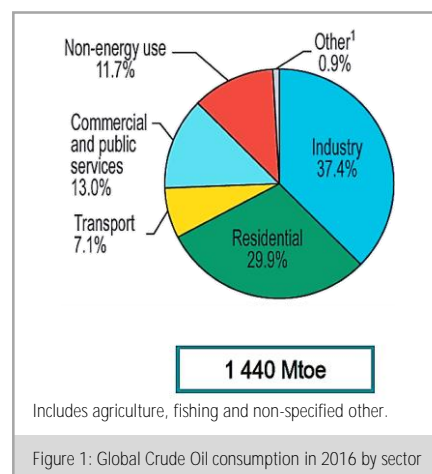
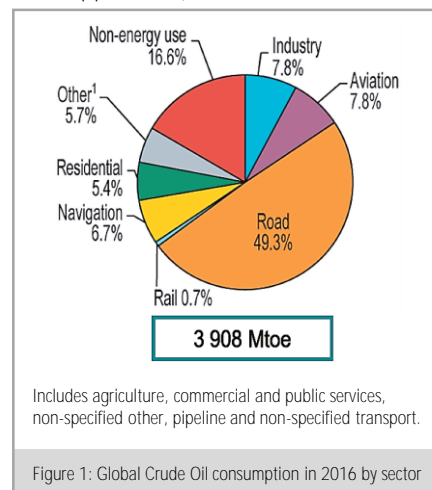
Keywords: Process Plant Equipment, Oil & Gas, Crude oil prices, Policies, Technology

Introduction

Process Plant Equipment (PPE) is the equipment required to carry out mechanical and/or thermal treatment or processing of raw material or product using physical or chemical methods. Our research is predominantly in PPE business of static equipment (viz. reactors, heat exchangers, pressure vessels) for Oil & Gas refineries, fertilizers, and petrochemical segments.

In the majority of the PPE business segment, the technology is controlled by the Technology Licensor. The client with a requirement to set-up a Greenfield plant identifies the Technology Licensor, the Front End Engineering Designer (FEED), and the EPC (Engineering, Procurement, and Construction) contractor. The Licensor carries out the feasibility study and readies the conceptual design. The FEED, in close tandem with the Client & Licensor, focuses on the technical requirement, works out project cost, and prepares basic design and 'FEED Package' that forms the basis of bidding for an EPC Contractor. The process plant equipment manufacturer forms a critical link of the EPC Contractor's supply chain.

Oil and gas, holding 53.3% of the fuel share in 2016, remain the major fuel source for world total primary energy supply (International Energy Agency, 2018, p. 2). The global crude oil & natural gas consumption in 2016, breakdown by sector, is shown in Figure 1 and 2 respectively (International Energy Agency, 2018, pp. 18-19).



Mtoe: Million Tonnes of Oil Equivalent

A Greenfield project in oil & gas refinery provides more business potential (in terms of value) as compared to a project in fertilizer or petrochemical plant. How do a variation in crude oil prices, government policies, and technology advancement in alternative fuels, the transportation sector, metallurgy, and alternative fuels impact the PPE business? What are the upcoming technology disruptions? Considering these questions we attempt to summarise the scenario for PPE business.

Methodology

We carried out the initial study of the sector with material available in public domain including the internet, and discussions with our colleagues. Based on the initial study, we interviewed leaders within L&T (in these sectors) with a set of focused questions in the line of the research.

Factors Influencing PPE Business Scenario

Based on our discussion with the business experts, we present the major factors that influence (and impact) the PPE business.

Oil Price Variation

An intergovernmental organization of 14 nations – Organisation of the Petroleum Exporting Countries (OPEC) – ensures stabilization in the oil market for benefit of the consumers and producers (OPEC, 2018). The supply-demand equilibrium in the world market determine the crude oil prices. A decrease in crude oil price below the threshold of \$55 per barrel may not make a Greenfield refinery investment viable. At the same time, reduced oil prices encourage increased oil imports and domestic investments in fertilizer and petrochemical plants in India. As shared by a domain expert, crude oil price of \$60 per barrel opens up investments in five to six Greenfield refineries, \$80+ per barrel for seven to eight, and a price rise above \$100 per barrel could encourage investments of around eight to ten Greenfield refineries globally. However, these investments happen with a time lag of about two years, and thus variations in oil prices during this interim period, will have a bearing.

Government Policies

Localisation. Many Middle East countries are implementing localization policies like In-kingdom Total Value Add (IKTVA)

and In-Country Value (ICV), with a vision to enhance the economy and create job opportunities. This mandates the industries to undertake certain percentage of the contract value in the project awarding country, thus, making them less competitive against the domestic industries of that country. Also, the nature of the heavy equipment and expertise involved pose additional challenges for implementing projects in other countries with localization policies. National Development and Reform Commission (NRDC) policy of China gives preferential advantage to Chinese suppliers for projects in China.

Export policies. Indian industries were the supplier base for process plant equipment for China. However, over time the Chinese manufacturers have replicated the processes and entered into PPE export with government support.

Though sourcing from China is currently restricted, the Chinese EPC contractors are seen supporting & positioning the Chinese PPE industries for exports in projects where the funding is from China. Currently, in projects where the funding is not driven by the Chinese government, the Chinese contractors prefer Indian PPE manufacturers.

Government funding. The governments of Japan, Korea, and China provide incentives to their domestic industries for PPE export to other countries, thus, providing them a benefiting edge on pricing as against the Indian Industries, which do not receive any government funding for export projects. Chinese industries, backed by the financial muscle of Chinese government, quote competitive prices, thus, posing additional threat to the Indian industries.

New Technologies

Alternative Fuels. Usage of alternative sources of energy - biofuels like ethanol, methanol, renewable resources like wind, solar, tidal, and nuclear is seen increasing. In 2015, around 18.6 % of the total energy supply in the world was catered by these alternative fuels (International Energy Agency, 2017, p. 6).

Also, shale gas (natural gas occurring within shale formations) has gained an increased importance as a source of energy. "Shale gas rose from less than 1% of domestic gas production in the US in 2000 to over 20% by 2010. The

Energy Information Administration projects that it will account for 46% of US gas supply by 2035." (Stevens, 2012, p. 2). With the increase in shale gas export from the US, it is found to be highly competitive if the oil price rises above \$60 per barrel. While the shale gas provides an opportunity of LNG plant projects, the shale gas extraction pose environmental challenges.

Industrial innovation in the field of Petcoke gasification (Syn gas) is also expected to replace natural gas. In spite of the increasing alternative sources, the fact remains that the numerous petrochemical by-products are used in various facets of daily life and does not seem to become obsolete in near future.

Electric Vehicle. Currently, the electric vehicle (EV) market is tiny and mostly in the luxury car segment. The EVs are likely to seek quantum jumps when the technology would permit to have longer battery life at economical prices and widespread infrastructure for charging. Though EVs are expected to pose a threat to the world oil demand, and hence PPE sector, they do not seem to affect much for over next decade. Also, major consumption of energy from oil & gas occurs in the transportation sector- navigation & aviation, which for a long time is expected to continue as is.

Electric Vehicle. Currently, the electric vehicle (EV) market is tiny and mostly in the luxury car segment. The EVs are likely to seek quantum jumps when the technology would permit to have longer battery life at economical prices

Digitalisation. Automation is seen to be widely implemented in the manufacturing process by PPE manufacturers in Japan and Korea. This helps increase the productivity. Due to high investments for automation, the Indian manufacturers continue to rely on semi-automated welding process.

However, semi-automation along with the availability of labour at economical price levels keeps the Indian manufacturers at par, on a cost basis, with their international competitors. Owing to the heavy nature of the equipment the 3D manufacturing technique is not seen to be explored in PPE manufacturing segment, at least in the immediate term.

Metallurgy. Selection of appropriate material for process plant equipment is the cornerstone and is controlled by the relevant Codes. Though acceptance and incorporation of metallurgical changes in

Technology Disruptions

Research is being pursued in the field of a micro reactors and micro exchangers which can significantly reduce size of process plants, and enable the production of the end products like refined hydrocarbons, fertilisers, and petrochemicals at the point of consumption, thus, eliminating the logistic cost. The development and implementation of this project in future pose a huge risk to the PPE business.

Findings and Conclusion

As the Greenfield project investments are largely driven by oil & gas prices, fall in these prices poses a major risk to the PPE industry. Foreign government policies of localization and financing for exports, coupled with extended supplier credit are seen to impact the Indian PPE manufacturers in high potential export markets. The increasing use of alternative fuels and electric vehicles are not expected to impact the business scenario significantly, at least till a decade. However, these, along with the successful development of micro reactors & exchangers and metallurgy are expected to be a game changer for the PPE business and pose a major risk in the long run.

Further Research

Our research is directed towards the overall factors that influence the Process Plant Equipment business scenario. A detailed research on correlation and impact of each of the above-listed factors need to be carried out.

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TRANSITIONING FROM L1 TO B1 (BEST ONE): AN ALTERNATIVE HOLISTIC APPROACH TO SUPPLIER SELECTION

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Abstract

Selecting the right supplier is a critical to present day operations for any organisation today. The widely used method for selecting a supplier of products or services is the L1 method, i.e. lowest price bidder. However, the lowest bidder may not always be the most suitable bidder resulting in quality, workmanship and delivery issues. In such an event, the overall cost to the organisation to salvage the situation tends to outweigh the cost savings obtained from selecting the lowest bidder.

This article proposes a holistic quantitative approach to supplier selection. The Supplier Credibility Score is determined by quantifying the evaluation of suppliers by different stakeholder departments within the organisation. The Price to Credibility ratio (P/C ratio) is then calculated. The P/C ratio is used as the criteria for selecting the B1 supplier, i.e. the Best Supplier. IT and analytics can be harnessed in optimising the above process to great extent.

Keywords: Supplier, Evaluation, Selection, Price, Credibility

Introduction

Organisations across the globe require various inputs such as raw materials,

component parts, labour etc for carrying out their day to day operations. Such input material and labour costs account for upto 80% of the total product cost,

especially for manufacturing and EPC industries. Organisations are dependent on the suppliers for meeting these needs. Therefore, in the current hyper competitive market scenario, selecting the right supplier is both a tactical and a strategic need for the organisations.

Selecting the right suppliers provides opportunities to reduce the costs in the entire supply chain process. The most widely used method of supplier selection is on the basis of lowest price. But, selection of a supplier solely on the basis of price can often lead to multiple issues related to quality, delivery, workmanship etc. The organisations then have to enter a damage control mode to salvage the situation. The project planning schedule gets disturbed and it diverts the attention of the employees from the customer centric value generating activities to damage control activities. The costs associated in such actions outweigh the cost savings accrued during the supplier selection stage. This hampers the efficiency of the organisation and has a direct impact on the organisations' topline and bottomline.

Thus, supplier selection is not just about the process of choosing the lowest price, but it is a process to select the right supplier who can deliver the best deal on

all the required criteria among the group of suppliers. The "right" supplier may refer to one who supplies products and/or services of intended quality, within the assigned schedule in the most cost-effective manner, be it for Project, Product, or Developer requirements.

Different methods for supplier selection

The above discussion gives us an insight into the fact that a well selected set of suppliers can give an organisation a strategic and tactical edge over its competitors. Therefore, there exists a continuous search among researchers and organisations across the globe to find new and better ways to evaluate and select suppliers. Researchers have developed a variety of methods and models to select the best supplier. Pal, Gupta & Garg (2013) have classified these concepts into broad categories. These are presented below in brief:

Categorical Methods

Categorical methods are qualitative models. Current and familiar suppliers are evaluated and rated on a set of criteria based on historical data and purchaser's experience. After this, the buyer gives an overall rating for each supplier. This process primarily helps to structure the evaluation process in a clear and systematic way.

Data Envelopment Analysis (DEA)

This process splits suppliers as either 'efficient' or 'inefficient'. Supplier evaluation is done on two sets of criteria,

i.e. inputs and outputs. The evaluation is relative. A supplier is considered to have a relative efficiency of 100% if he suppliers within different clusters. Suppliers within same clusters are more homogeneous whereas clusters are heterogeneous. This method reduces a large set of suppliers into more manageable subsets.

Analytical Hierarchical Process (AHP)
This is a decision-making method for prioritising alternatives considering multiple criteria by arranging them in a hierarchy. AHP incorporates both qualitative and quantitative criteria.

Analytic Network Process (ANP)
ANP follows from AHP. It is a comprehensive decision-making technique incorporating feedback and interdependent relationships between decision attributes and alternatives.

Total Cost of Ownership Models (TCO)
This model considers all the costs involved in selection of a supplier. It then adjusts these costs from the quoted price of the supplier and thereby arriving at the lease cost.

Technique for Order Performance by Similarity To Ideal Solution (TOPSIS)
In this method, a closeness coefficient is determined and suppliers are ranked based upon their relative closeness to the positive and negative ideal solutions.

Multiple Attribute Utility Theory (MAUT)
This linear weighing technique enables purchasers to formulate procurement strategies handling multiple conflicting attributes. This is mostly used to select international suppliers which have more uncertainties and complexities.

Mathematical Programming (MP) Models
Mathematical programming models enable purchasers to consider different supplier selection constraints by quantifying the criteria to select the best supplier. This can be done either through Multi-objective Models or Goal Programming Models.

Artificial Intelligence Methods
These are computer based systems which use historical data and experience. Case-Based-Reasoning (CBR) and Artificial Neural Network (ANN) are some of the techniques under this model.

Fuzzy Logic Approach
In this method, linguistic values expressed in trapezoidal and triangular fuzzy numbers, are used to assess the rates and

weights for various factors. A weighted normalised fuzzy decision matrix is then constructed. A closeness coefficient of each supplier is defined to determine the ranking order of all the suppliers. Strategic Sourcing is a procurement strategy for value creation within purchasing processes, focused on building mutually beneficial results for all parties involved and is a source of sustainable competitive advantage for the buyer. This requires not only a shift in mindset, but extensive data gathering and analysis.

The B-1 Model
The B-1, i.e. the Best Supplier selection method is a hybrid model. It is a combination of Categorical Method which takes in to account the qualitative aspects and the Mathematical Programming model which considers the quantitative criteria. The goal of this method is to minimise the overall cost to the organisation incurred by selecting the most dependable supplier. The dependable supplier is less likely to deviate from the delivery and quality commitments. Thereby last minute surprises along with the associated costs for such instances will be minimised.

Evaluation Criteria
The criteria considered to meet the above goal are the following:

- Price
- Quality
- Delivery
- Performance History
- Production Facility and Capacity
- Technical Capability
- Financial Position
- Reputation in the industry
- Desire for business
- Geographical location

Methodology
The B-1 method involves the following steps which are explained below:

Step 1. All steps as followed in the present L-1 system shall be followed till the final negotiated price is received from the bidders based on uniform techno-commercial terms and conditions.

Step 2. The stakeholder departments in the organisation will evaluate the suppliers based upon the above criteria. Each department will award a score between 1 to 5; 1 being the least and 5 being the most preferred. Each department is given a weightage. The departmental weightages are assigned based upon two criteria:

1)The level of interaction with the

suppliers

2)The extent to which the departmental performance is likely to be affected, i.e. the stakes of the department in supplier selection.

The stakeholder departments with the respective weightages is given below.

Department	Weightage
Purchase	0.25
Execution	0.25
Quality	0.2
Design & Engineering	0.15
Finance & Accounts	0.15

The data for evaluation is to be collected from the suppliers, past history as well as other independent and unbiased sources. The weights assigned to each Department in the table above are indicative and pertain to the author's business and industry. Readers are

The data for evaluation is to be collected from the suppliers, past history as well as other independent and unbiased sources. The weights assigned to each Department in the table above are indicative and pertain to the author's business and industry. Readers are advised to study their organization, business domain, industry, and overall economic and strategic environment to arrive at optimal weightages for their business, product, systems, services etc. Step 3. The total weighted average score thus calculated for each supplier will provide the Credibility Score of that supplier. The Credibility Score will reflect the dependability aspect about the agency. Step 4. Finally, the ratio between the final negotiated price and the Credibility Score is calculated which is denoted as the **Price to Credibility Ratio (P/C ratio)**. This ratio is the selecting criteria. The supplier with the lowest P/C ratio is selected as the successful bidder.

It is important to mention here that the aforementioned criteria, departments, and weightages are not ubiquitous and readers attempting to implement this method will need to develop their own model basis the context and criticality of their business, project, product or service, and systems.

Advantages

In this method, a bidder is assessed on different parameters by different

departments, thus making the evaluation holistic and unbiased. Also, the best supplier may not be the costliest supplier. However, the success of this model is subjective to how effectively the stakeholders evaluate the suppliers.

It must also be noted that as this system is propagated across the organisation, the sample size of evaluators will increase. This will enhance the unbiasedness of the evaluation. The

evaluation data for each supplier can be stored in the organisation's ERP system. Thus, it is expected that the accuracy of this model will increase with time.

Conclusion

In the current hyper competitive market scenario, completing projects within the scheduled time and budgeted cost is of utmost importance, especially for manufacturing and EPC organisations. Project managers and supply chain

managers are always under pressure to deliver the right materials in the right time and cost. In such a scenario, a supplier having a high credibility score will thus be more dependable and is likely to deliver as per the negotiated commitments. Thus, the costly time and budget overruns can be minimised which will improve the efficiency and reputation of the organisation in the market. This can further act as an order multiplier for the organisation in the future.

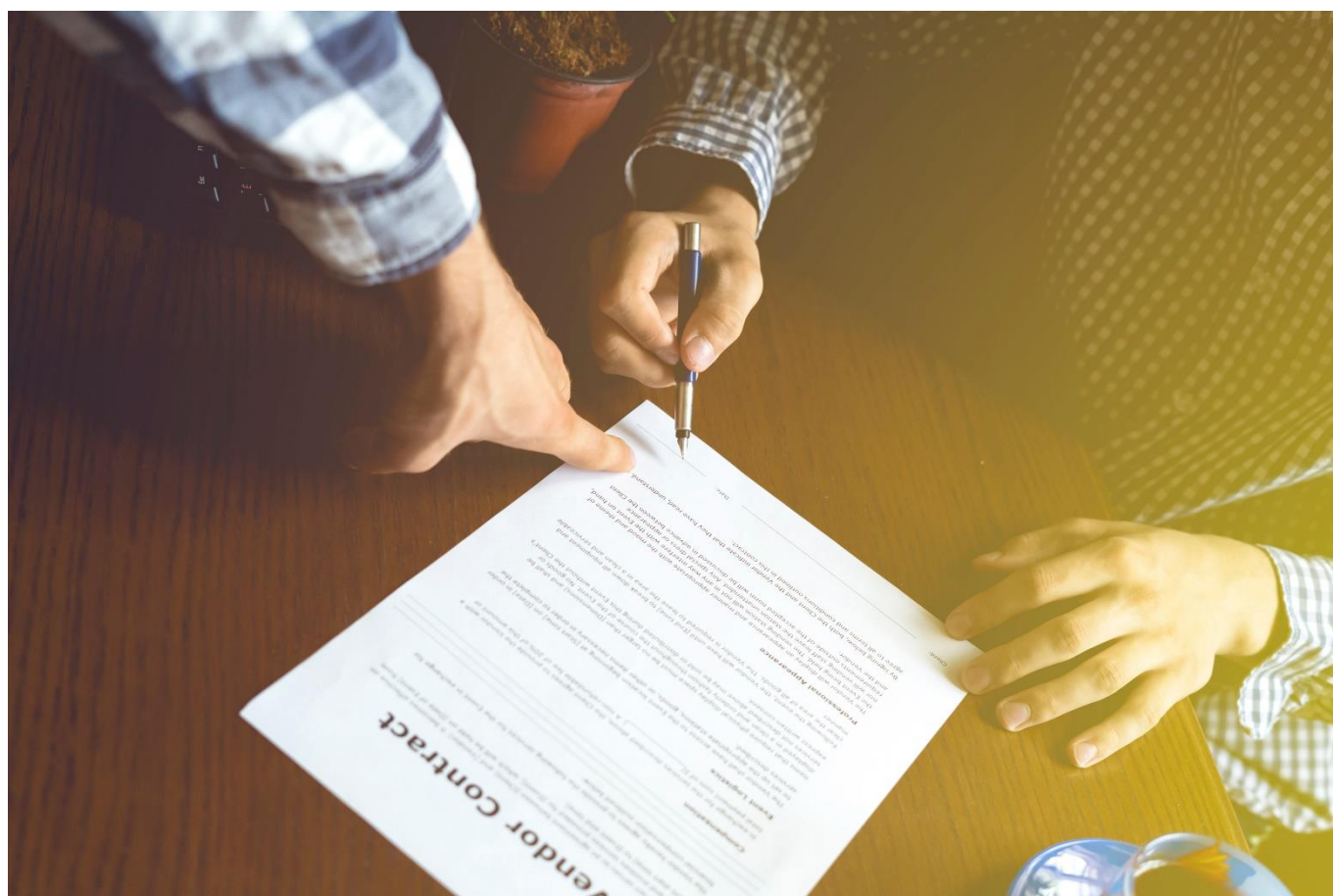
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MANAGEMENT INFORMATION SYSTEM ALIGNED WITH BUSINESS STRATEGY & KEY PERFORMANCE INDICATORS

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Abstract

Today large organizations handle enormous amounts of data while carrying out their operations to meet company objectives. Such data is analyzed by different users in order to mine meaningful information specific to their roles. This is a time-consuming process and doesn't add significant value to the final outcome. This paper probes into the loss of productivity at various organizational levels. The current management information systems (MIS) just facilitate day-to-day operations whereas the need of the hour is to use these systems to contribute to the larger organization goals through alignment with business strategy. This requires development of an MIS which is line with the key performance indicators of the individuals and the organization as a whole. The paper focusses on elimination of low-value added activities and utilization of output from the modified MIS to increase productivity and yield better results.

Keywords: Management Information Systems, Key Performance Indicators, Organizational Objectives, Business Strategy

Introduction

Management Information Systems are systems which gather data and provide relevant information crucial to management operations and decision-making in a company. These systems are implemented at different levels, departments and geographies of the organization. They play a pivotal role as they provide vital information for planning, monitoring and controlling functions of the company after due analysis of the data gathered. Hence, they can influence effective decision making and bring in efficiencies in the organization if implemented properly.

Literature Review

While it may be argued the ledgers kept for accounting purposes may be the most rudimentary form of MIS, the earliest MIS can be attributed to the invention of the calculator by Blaise Pascal in the early 17th Century. However, Laudon & Laudon (1998) divided MIS into 5 eras starting from the earliest era of mainframe computing to the latest era of cloud computing. Ever since the advent of MIS, these systems have become integral to any organization's operations and success. Given the extent of employees' interactions with the MIS, the quantum of data made available, and the potential for this data to support employees' interactions with the MIS,

the quantum of data made available, and the potential for this data to support Management in decision making there is a strong case for aligning MIS to the Organization's strategic outcomes (Coltman et. al., 2015). Henderson and Venkatraman (1993) established a model for aligning MIS to strategy. Several others like Sabherwal and Chan (2001), Preston and Karahanna (2009) have worked along these lines or extended the Strategic Alignment Model to make the system more practical or grapple with new environmental challenges. However, as pointed out by Moore (2012) there are several challenges of achieving and sustaining such alignment.

What goes wrong?

Even after implementation of MIS, several organizations are not able to leverage it for their profitability and success.

The paper focusses on eliminating low-value added activities and utilizing output from the modified MIS to increase productivity and yield better results.

Some fundamental mistakes are made in the implementation of MIS, which renders it ineffective:

i) Designing MIS to suit the day-to-day operations of managers and this is where things go wrong. Instead of providing

decisive information, the MIS just provides data in a structured format. In such a case, the company fails to completely utilize the MIS to extract the valuable information after due analysis.

ii) The MIS is put to such an extensive use that every piece of data is routed through it. Ideally, only information pertinent to the business strategy and key performance indicators of the company should be provided as an output. However, in this case the MIS displays humungous amounts of data and focus is lost from the essential information for which it was originally intended.

Business Strategy

It is defined as the means through which long-term business objectives of the organization can be met. It involves long term planning to create opportunities for business growth, consolidating to a strong financial position and at the same time maintaining competitive advantage.

Key Performance Indicators (KPIs)

Key Performance Indicator is the measurement of the extent to which the goal of an individual or an organization is achieved with respect to set target. There can be multilevel KPIs, starting from individual level to departmental/functional level to finally to the organization level.

Generally, KPIs are adopted based on the industry standard. But each organization is unique, integrally different from the other in terms of their strategy and roles & responsibility structure followed. If the KPIs are not defined according to the unique nature of business, there is often a conflict between KPIs, organizational goals and responsibility of the individuals/departments. The achievements against the KPIs are indicators of health of an organization and a useful tool for decision making. These results show an adverse indication if the current situation of organization is not as per business strategy. This creates a system to check and balance the situation with the required corrective/preventive actions.

It is evident that the business strategy and key performance indicators are indispensable for an organization's growth and profitability. Hence, there arises a need to design & implement an MIS in such a way that is aligned to the business strategy, the KPIs of the personnel and the organization. If such an alignment is not ensured, the MIS could prove counterproductive and could induce redundancies in the organization.

Methodology for alignment of MIS with KPI

A Systematic Approach

The mission and vision of an organization forms the basis for formulation of its business strategy. Subsequently, the organization structures its functions in line with the business strategy with roles and responsibilities defined at different levels. This further defines the KPIs of an individual/department as a measurement aligned with the overall strategic goal.

To measure current performance against the KPI and to achieve the target set, individuals/departments need the information which shows them the current status and can help them in taking corrective action, if required. This is where the need of an aligned MIS arises. MIS shall be designed in such a way that relevant information is captured, analyzed and customized as per information needed to achieve the targets against the KPIs.

To design the MIS precisely and effectively, KPIs are the key parameters that guide the structure and design of the MIS.

The misalignment between KPI and MIS does not allow the organization to effectively achieve its targets. The need of the hour is to set both inline to ripe benefits of MIS in achieving productivity and organizational objectives. This is illustrated in Table I through a matrix representation of the relationship between KPIs and the MIS implemented.

Findings & Conclusions

As illustrated in Table I, the best-case scenario is when the KPIs are set in accordance with the long-term business strategy and the MIS reinforces these by capturing, and providing meaningful information required. Any deviation will lead to inefficiency in the system and/or inaction. If MIS does not provide relevant information, even correctly formulated KPIs alone cannot help. Similarly, relevant information provided by MIS alone cannot function properly as misaligned KPIs will lead to deviation from set objectives.

Hence, setting of both KPIs and MIS aligned with the strategic objectives is the prime requirement, to be successful in the long run.

The above findings are illustrated below with the help on example.

Illustration

One of the strategic objectives of an organization is to achieve percentage reduction in cost of goods produced. Consider a manager working in Operation function of the organization. In such a case, the manager is not directly involved in cost related decisions such as purchase price of inputs or the sales price of the product. Hence, his KPI cannot be directly related to cost. However, in order to serve the organizational objective of cost reduction, his KPI can be defined with respect to maximizing the capacity utilization without increasing the fixed cost or addition of any assets. Accordingly, the MIS should be designed to provide capacity utilization information to the manager which would ensure that the MIS is aligned to the business strategy as well as the KPIs. This is best case scenario as concluded above.

Limitations

Lack of systematic approach and unavailability of a standard process is a hurdle in setting the right MIS system for organization. A clear and in-depth understanding of the business strategy is required whereas today's business environment does not afford such luxuries of time. Additionally, there is a lack of expertise to develop an effective and aligned MIS to suit the needs of the organization.

Further Research

Once the MIS is established in line with the KPIs and the results are verified over a period of time, further research can be done and MIS can be developed to provide:

i) Live tracking of "Target vs. Achievement" information of KPIs. Monitoring achievements against the KPIs indicate the health of an organization and a useful tool for decision making. These results show an adverse indication if the current situation of organization is not as per business strategy.

ii) Trend Analysis from historical data to improve future business strategy

iii) Real time information to all geographies & locations of the organization.

This can be done by integrating MIS with technologies like Internet of Things, Big Data & Cloud Computing.

MIS			
KPI		Correct	Incorrect
	Correct	Best-Case Scenario All relevant information is available through MIS to act upon & achieve set KPI aligned with the organization goal.	KPIs are set correctly but information is not available to act upon and correct action and align it to objective.
	Incorrect	Correct information available to act upon but wrong selection of KPI not allowing individual / department to act upon and achieve common organization-al goal	Worst-Case Scenario Irrelevant information flowing to the system and KPIs are also not aligned with the goal set.

Table I: Matrix representation of the relation between KPI and MIS

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BATHING WATER, A BILLION DOLLAR MARKET

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Abstract

Drinking water is already a multibillion industry in India and we often read about mismanagement of potable water resulting scarcity. If we prioritize the need of clean water for any human being, Washing and bathing water is significant after Drinking Water. Numerous studies conclude the scarcity of water for basic requirements in near future which will result in commercialization of water for domestic use including bathing. The author recommends proactively studying the problem of water scarcity the solution to which could lead to the creation billion-dollar industry in the coming future. This paper is an initial exploration into the subject and hopefully opens up avenues for further research.

Key words: Grey water, Purification, Water scarcity, Environmental friendly.

Introduction

Bottled water segment amounts to revenue of \$7.06 billion in the financial year 2017-18 in India and expected to grow at the rate of 14% every year (Statista.com, 2018). The industry had boomed due to scarcity of Potable water and similar situation is expected for other uses of fresh water. Even though, bathing water is not as essential as drinking water for survival, it is important and a necessity in a civilized world.

Bathing water as an industry is unimaginable in the current scenario though we often hear about scarcity of the same every year in major cities. Quite often, numerous studies have indicated that availability of fresh water would become a major constrain in coming future. Increasing GDP and enormous growth in population will add to the fresh water demand.

Unlike bottled water, bathing water cannot be bottled and sold in retail stores. The key lies in the system which reuses the water and decreases the necessity. A similar approach is presented in this paper as a concept which can further be turned into a successful business model.

Water as a natural resource:

Rivers, lakes and Ground water are the main sources of fresh water which is approximately 0.7732% of total water on earth (Gleick, 1996). This makes it evident that how limited clean water resource is and importance of alternative methods to save it.

According United Nations report, 21 cities in India will run out of water by 2030 and these cities are expected to reach zero ground water level by 2020 (Shukla, 2017). The same report also elaborates that water demand will reach 1.5 trillion cubic meter in 2030 while current water supply is only 740 billion cubic meter. Absence of necessary infrastructure is one of the major reason for water mismanagement and all leads to more dependency on rain every year.

Concept of reusing grey water

Bathed water is often referred as gray water which means 'relatively clean waste water from baths, sinks and other domestic appliances'. The concept of reusing grey water is not new to explore and numerous applications are available where grey water is reused for other utilities. For instance Grey water from bath and sinks are reused for flushing toilet and watering garden plants. We also have examples where grey water is recycled and used in amusement parks. However, concept of reusing grey water for bathing is new and more research is required to understand the system.

We are dependent on rain as a source for fresh water every year. Shortfall in rainfall leads to scarcity of water availability and currently purchasing water from suppliers is the major practice in existence. An alternative system can be developed to minimize the dependency and technology is already in existence for the same.

Water is purified naturally either in gaseous or liquid form. Used water along with unused fresh water evaporates into gaseous form due to sun heat and come back in the form of rains as a fresh water source. Water absorbed by soil in liquid form will filter it naturally by removing small particles and chemical absorption increasing ground water level.

Equipment are already in existence which purify grey water making it as clean as natural fresh water. Some of the systems like reverse osmosis and distillation will yield water much more purified than naturally available fresh water. On average, 30 Liters of water is required for an individual for bathing purpose (Reed, 2005). Purifying water of this quantum on daily basis is not a big task and equipment's can be installed to execute such filtration in minimal time. Figure 1. shown below represents schematic arrangement for gray water purifying system which can be reused for bathing.

Economy of the concept

In general, bathing water is heated approximately up to level of 35 to 40 Degree Centigrade based on weather condition using either electric or solar heaters in most urban houses.

Purification in gaseous form requires boiling the water twice or thrice of the nominal usage by these equipment. Even though boilers are effectively used for other purposes in various industries, efficient equipment for domestic usage can be developed. Similar equipment for.

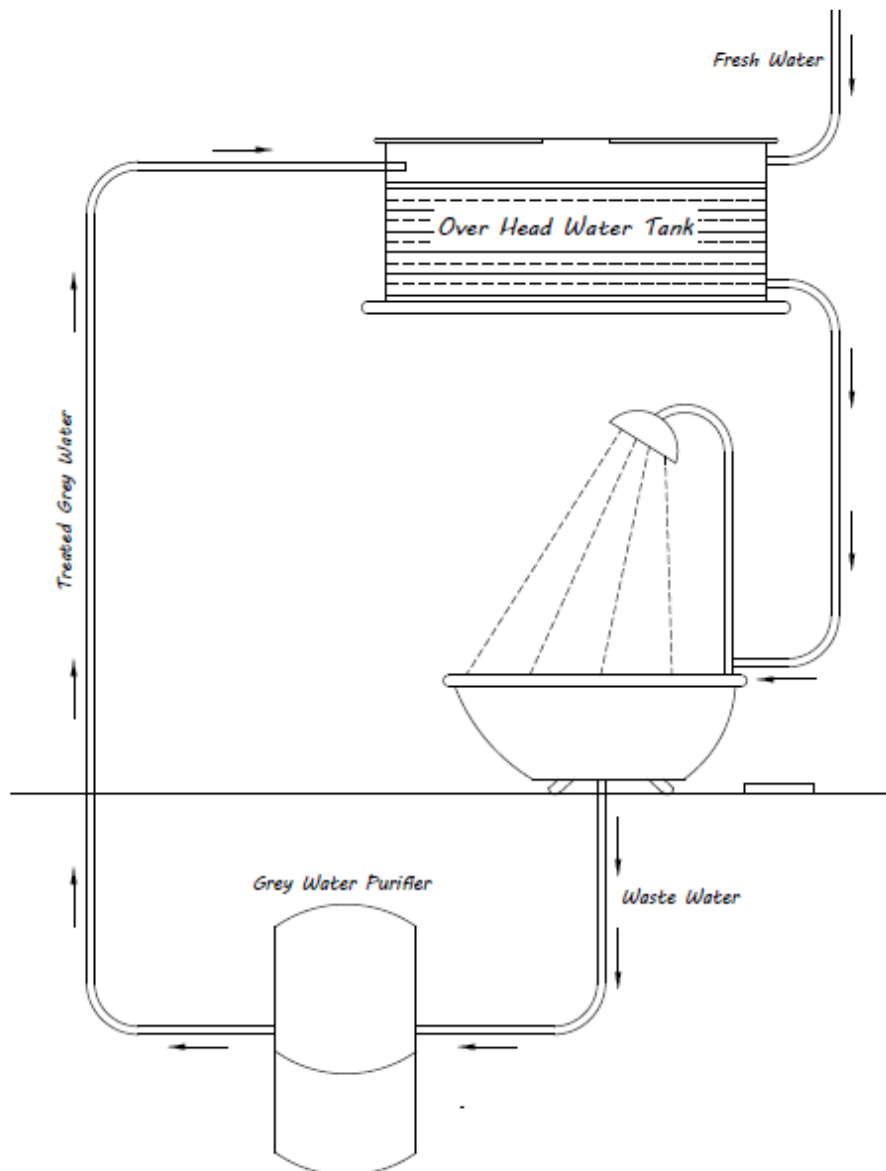


Figure 1: Schematic Representation of system for reusable bathing water

purification in liquid form using chemical process can also be developed

This reduces the dependability of fresh water for bathing every time in full and restrict the requirement only for the water evaporated/leaked during the process of purification. Trends reveal that water scarcity is increasing every year and will lead to a point where cost of access of fresh water will surpass the cost of energy and capital requirement for purification of water. Like rain water harvesting, government may mandate the installation of such system in days to come for utilizing rain water for more important needs like drinking and agriculture.

Conclusion

Effective system to reuse Bathing water may not be the need of the hour due to

availability of fresh rain water in considerable quantity at all places. Increasing GDP and population along with lack of infrastructure to manage available fresh water may lead to scarcity in the near future. Research and development of such systems for domestic usage will lead to possible high value market in coming years. The ongoing trends and research suggests that government may mandate installation of such systems to manage available fresh water.

The business implications are to explore energy and cost effective technologies to produce and supply bathing water to households and other residential units, and develop a sustainable business model to monetize the same. The author hopes that this concept note will lead to further research into the subject including market surveys, and developing a proof of concept.

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AN ANALYSIS OF STRATEGIC PARTNERSHIP MODEL IN THE INDIAN DEFENCE SECTOR

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Abstract

This text aims to investigate the Strategic Partnership (SP) model mooted by the Ministry of Defence (MoD), in order to invigorate defence manufacturing under the “Make in India” program. The program intends to identify and develop a few key organizations from the private sector as ‘Strategic Partners (SP)’ for indigenous production of critical frontline military platforms viz. Fighter Aircrafts, Helicopters, Submarines and Armored Fighting Vehicles (AFVs) / Main Battle Tanks (MBTs). Further, this que model especially for submarines segment, the challenges and plight of affected stakeholders.

Keywords: Strategic Partnership, Defence, Shipbuilding, Make in India

Introduction

After almost 70 years of independence, the state of Indian defence sector is still dominated by heavy imports and reliance on foreign technology, with India accounting for 12% of international arms imports between 2013 and 2017 (The Hindu, 2018)

The root of this melancholy in Indian defence sector (Manufacturing) dates back to the British rule where it was said that in addition to manufacturing in India being an expensive affair, the locally made products were lacking in ‘requisite handiwork’ and there was no machinery or scientific skills available. Post-independence, the prevailing socio-

economic conditions and socialist views resulted in low priority for uplifting this sector and the industrial policy of 1956 unwittingly strengthened this position (Committee of experts for Amendment to DPP, 2015)

Our economic development models easily provided more business to the public sector units, especially in the defence sector. Majority of the defence equipment that India is procuring internationally are manufactured by the private industry, however, the Indian private sector has been kept away from participating in any major defence production. Realizing the potential of the private sector and the global defence-manufacturing scenario, the policy of public sector reservation in defence equipment manufacturing was abandoned in 2001-2002, and was opened to the capable private players (Committee of experts for Amendment to DPP, 2015).

In this text, we reflect upon the proposal of ‘Strategic Partnership’ model proposed by the committee of experts for amendments to Defence Procurement Procedure (DPP) 2013, in order to involve the private sector in major defence manufacture and technology.

The Problem:

Blind Faith on the DRDO - Defence Public Sector Units: The report by Indian Defense News, “Armed forces say no to advanced versions of Indigenous ‘Tejas’, ‘Arjun’” dated 13

Nov 2017 states that the “DRDO - defence PSU lobby “overpromises and then under-delivers with huge time and cost overruns”.

The ‘Arjun Main Battle Tank’ and the ‘Tejas Light Combat Aircraft’ projects were sanctioned in 1974 & 1983 respectively. According to the above report, only 5 units of Tejas with initial operation clearance and 124 units of Arjun that cannot cross bridges and culverts in Punjab & Northern desert, are inducted into service.

Interestingly, Tejas has around 40% of import content with majority of it manufactured privately. The same for Arjun, is around 55%. The question therefore arises as to why the Indian government is reluctant to trust the Indian private sector industries that possess idle capacity and the resources acquire technology and production of defence platforms. Similarly, in the case of Dhanush, the flagship indigenous artillery gun, the army and the ordnance factory board – maker of Dhanush, are in disagreement over the quality of these guns delivered.

After decades of red-tapism, due to the painful delays in procurement which has created unreliable defence infrastructure, severely crippling the preparedness of the country, the Strategic Partnership model is seen as the last hope.

The Strategic Partnership model

Ministry of Defence (MoD) established a committee to give recommendations for

the much needed amendments to the Defence Procurement Procedures (DPP). Following were the mandates of the committee (Ministry of Defence, 2016) To evolve a policy framework to facilitate, “Make in India” in Defence manufacturing and align the policy evolved with the Defence Procurement Procedure (DPP-2013) To suggest the requisite amendments in DPP-2013 to remove the bottlenecks in the procurement process and simplify/rationalize various aspects of the Defence procurement.

The committee of experts under the chairmanship of Shri Dhirendra Singh came out with their report in July 2015. The report has advocated the case for Private sector inclusion in the defence manufacturing by way of examples across the globe. It states that

“Having considered the nature of defence materiel and the configurations of defence industry worldwide we have come to the inevitable conclusion that if the strengths of the private industry are to be harnessed then they must be done under well-defined models depending upon the strategic needs, quality criticality and cost competitiveness. Whenever the vendor base is large and competition is feasible, the competitive bidding process must be followed. There are cases, however, where certain platforms are of strategic importance. For these, we are recommending the *‘Strategic Partnership model’* for creating capacity in the private sector on a *long term basis*.” (Committee of experts for Amendment to DPP, 2015, pp. 46-47)

The model is proposed to create manufacturing capability over and above the existing capacity in the public sector. It is pertinent to mention that the model brings large benefits to both MoD as well as the private sector. Private Sector players will get an opportunity to participate in large-scale contracts, which so far have been reserved only for the DPSUs. For MoD, the model ensures to reap the benefits of better technologies that private companies bring to the table, superior yard infrastructure, profit orientation thereby bringing efficiency and dynamism.

While the SP model mandates to select key private players for each of the identified sectors and announce them as “Partners” in the respective program, there are few glitches, which are required to be addressed by the Government during implantation of SP.

Any contract is awarded by the L1 concept, wherein competitors are invited to bid for a particular project and the party with the lowest commercial bid wins. This philosophy may not work for the strategic partnership model as it demands long term investments in infrastructure by the private entities. If the investment is seen only for a particular project without any assurance of contract award, private players may not participate enthusiastically under uncertainties.

The very purpose of proposing the SP model is to encourage the Indian industry to be involved in independent product development without any long-term dependency on foreign players. While the committee strongly advocated following the cost plus model (private yards are compensated with a defined rate of profit) and not follow the practice of L1. However, the SP chapter mentions that the selection procedure for the SP shall be on the lowest bidder segment wise.

Another major issue seen with the establishment of the SP model is that it does not ensure repeat orders but rather directs to treat each project separately. This simply means identifying strategic partners project wise. No Private firm would like to invest hundreds of crores of cash capital in infrastructure where there is no certainty on the long-term assured orders and have to compete with industry competitors (in addition to the public cash rich DPSUs backed by the sovereign) on a project-to-project basis. This puts the entire SP model on a sticky wicket as it defeats the basic meaning of the word “Strategic”.

Another Task Force headed by Former DRDO Head, Dr. V K Aatre has also submitted a report (Ministry of Defence, 2015) where the committee presented its recommendations on the procedures to be followed while selecting a strategic partner. The DPP 2015 recommends that a government should adopt strategic partnership model where a private company is identified only for the development of a specific identified platform. Restricting one group to one platform is a socialistic measure which restricts the potential to achieve economies of scale for an established and diversified private defence player.

After the report from Task force and also consulting various stakeholders from the industry, MoD has issued DPP 2016, however the final version is now

a difficult one to implement with hybrid procedures, resulting in zero awards under the strategic partnership model.

The Strategic Partnership model, if implemented with focus, in transparent but tough means, will become a tool to reduce the total cost of defence imports with the Indian private sector playing a crucial role of engaging all stakeholders, including the foreign OEMs, for developing indigenous defence manufacturing. Private players will bring various benefits such as more accountability, efficiencies, faster technology absorption, widening the skill base and triggering innovations. All these would result in lesser dependence on imports and gradually ensuring self-reliance for supplies of equipment for national security.

Indian Shipbuilding Sector

The Indian shipbuilding industry is responsible for 8% of the entire global trade. Almost 90% of the country's trade by volume is done by sea (Gaille, 2018). Indian shipyards have less than 1% of the global shipbuilding and repair market. In comparison, China, Singapore, and nations of the Middle East may have a share of almost 45% (Gaille, 2018). Indian shipbuilding sector is very much fragmented with over 8 primary shipyards controlled by public and private sectors.

In Submarines context, during the time when SP model was announced, most of the submarine projects were in limbo.

MoD announced the SP for executing project P75 (I) in order to boost the Make in India initiative, however the strategy to implement the same lacked clarity. Major private yards, namely Larsen & Toubro, Reliance Naval & Engineering and ABG Shipyard were finalised by a yard audit committee. However, ABG was excluded due to its ongoing stressed financial state and Mazgaon Docks Ltd. (MDL) was included in the list. Inclusion of a DPSU under the strategic partnership model stands a blow to the entire concept as it not only represents a conflict of interest for MoD, it discourages ‘capable but constrained by resources’ private players to establish the required infrastructure.

While the Request for Proposal (RFP) have already been issued to the foreign players, RFP for their Indian counterparts are delayed with challenges in implementing the hybrid model having the private as well as DPSUs in the list.

Way Ahead

The strategic partnership model as it appears to result in long term benefits, does not really translate into realizable benefits in its current form. Considering the fact that the MoD has expended considerable number of years to arrive at the current state of policy, it clearly indicates that Indian defence industry needs political conviction in order to undertake corrective measures and implement the strategic partnership in a

righteous possible method.
The authors conclude as follows: -

In order to implement SP while ensuring competition in the market, MoD can identify two capable private players in each segment and then continue to develop both for competition, while ensuring both get equal and assured opportunities for their growth in business. Implementation of Public Private Partnership (PPP) by opening up the defence export for these players

may ensure sustainability in potential growth and development.

Above may be seen as a threat to the defence PSUs. However, efforts may be undertaken to privatize the PSUs and bring them under the umbrella of strategic partners. This may sound awful, however the sovereign may acquire a controlling/ veto stake in the participating players. This will allow for fair sustainable environment for defence development in the country.

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ROAD CONSTRUCTION INDUSTRY IN INDIA: ISSUES AND WAY FORWARD

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Abstract

With advent of civilization, roadways has played the vital cog in mankind in his quest for mobility and exploration. Road construction industry has been in existence since the pre-medieval times and it is still undergoing continuous evolution. Presently road construction is being carried out in the world with various forms of financing encompassing numerous stakeholders:

1. Unit Rate Contract (BOQ) - Financed by Government
2. BOT (BOOT, DBFOT) - Involving concessionaire who will develop the facility, operate and transfer to government after completion of concession period.
3. EPC module - Design and construction by contractor, operation by client
4. Turnkey Project.

With the advent of PPP (Public Private Partnership) mode of infrastructure development, which focuses on end to end solutions ranging from Engineering, Design, Procurement, Built, Operate, Transfer or combination of above, big construction firms have shown their interest to build state of the art road infrastructure in India in a time bound manner. Many firms like L&T with EPC/ BOT approach of road development revolutionized the industry and built many roads within short spans of time.

The EPC/BOT mode of road development looks very optimistic and promising, but

some key constraints have impaired the vision of this approach rendering it redundant. This study discusses some of the issues faced by the road construction industry, like permissions, environmental concerns, labour, scheduling, budgeting etc.

It's the need of hour to attend the redundancies to allow the development of road infrastructure development reach its full potential.

Keywords: Build Operate Transfer (BOT), Build Operate Own Transfer (BOOT), Engineering procurement and Design (EPC), Independent Engineer (IE), Concessionaire, Delay, Time Overrun, Change of scope (COS), Risk Analysis, Risk Matrix

Introduction

Road Infrastructure development like other development projects is the lifeline of any nation. Better the infrastructure, better the mobility and access to every iota sqm area of the nation (Refer Appendix A). BOT/ EPC method of road infrastructure is very promising but unable to unleash its full potential due to impeding constraints. Unless these kinks are addressed, the course of development will be defeated. There is a need for problems to be made known to the relevant stakeholders to be addressed effectively. This will ensure successful and timely delivery of the road infrastructure to

customer and nation at large.

Objectives

The main objectives of this study are as follows:

- To identify the main key factors attributing to delays in Road Construction, in EPC based road construction.
- To classify the factors based on obligations by functionality.
- To arrive at key possible solutions/ recommendation for easing out the deadlocks

Literature Review

Numerous studies have been conducted in the past to discuss the causes of delay in construction projects. Each construction project is unique in nature possessing distinct issues which need to be assessed with varied degree of impact on the project. Iyer, K. C., & Jha, K. N. (2006) state that Three factors, namely, commitment from project participants, competence of owner's and managing conflict among project participants help boost the performance level of road construction projects while factors like coordination among project participants; project manager's ignorance and lack of knowledge; hostile socioeconomic environment; and indecisiveness of project participants cause the schedule performance to stagnate at its existing level.

Morris and Hough (1987) conducted an extensive study on mega projects having great potential economic impact but were poorly managed. These projects generally failed to identify the factors that would lead to their success or failure, such as likely project objectives, technical uncertainty, vested political interests, community involvement, urgency of schedule duration, financial contract legal problems, and implementation problems.

A study by Venkatesh et. al. (2012) reveals that critical factors influencing resource allocation are materials selection, changes in types and specifications during construction, equipment maintenance issues, logistics issues, cashflows, force majeure, supply and skill set of labour, procurement and quality issues of materials. Resources like manpower, materials and equipment related factors are having a total contribution of about 60% and other groups are having of about 40% in resource allocation.

As advocated by Pai, S. K., & Bharath, J. R. (2013) The first step in reducing the delays in infrastructure construction project is to understand the root causes of the delay. The results provide a list of root causes and issues that are directly responsible for most infrastructure construction project delays.

Methodology

Risk analysis method was followed to surface the degree to which various factors had an impact on project management. Based on their prominence, these factors were rated as Critical, High, Medium, and Low to direct the action plan with responsibilities attached. All the identified inputs are based on experience from similar projects executed in the recent past.

Stake Holders in Road Construction

The key Stake Holders in Road Infrastructure involved the following but not limited to:

- Authority (NHAI or State owned body)
- Independent Engineer (IE) appointed by Authority as technical firm. The power vested to IE depends upon the modality of contract i.e., BOQ Vs EPC Vs BOT.
- Concessionaire, in case the project is given on Turnkey/ BOT basis.
- Project Management Consultant (PMC), appointed by concessionaire, if the

Sl. No.	Parameter	Stakeholder Obligation	Remarks
1	Land Handing Over	Authority	State Authority
2	Encumbrance Free Front Handing over (including utilities)	Concessionaire	
3	Tree Cutting	Authority/ Concessionaire	Approval from Forest Department
4	Statutory Approvals	Contractor/ Concessionaire	Form-V for workmen, NOC for Plants
5	Appointment of IE	Authority/ Concessionaire	
6	Socio-Economic Condition of the region	Authority	Ensuring Safety of contractor & its resources
7	Design and Drawing approval	Concessionaire/ IE	
8	Availability of Raw Material	Contractor	
9	Availability of skilled workmen	Contractor	
10	Availability of skilled staff	Contractor	
11	Cash flow	Concessionaire/ Contractor	Huge Client and subcontractor Outstanding
12	Collusion of Authority against Project Management team to transfer onus arising from non-fulfillment of their obligation	Authority/ IE/ Concessionaire	Project Management team will the worst affected party.
13	Scope Clarity	Authority	Change of Scope
14	Time Overrun	Authority/ Concessionaire	Delays not attributed to contractor
15	Cost Overrun	Authority/ Concessionaire	Underutilization cost

Table 1: Key Parameters

contract in on BOT terms.

- Concessionaire may deploy its own in house team in case of PMC, if warranted.
- EPC Contractor, the main executing agency with its own in house design team.

Factors (Contributing to Delay) in Road Construction

The key factors encompassing the project management, whose timely scheduling and compliance is necessary

for timely delivery of project are listed out in Table 1.

The above factors are key to any road construction project and failure to manage them present are chronic issues that are rampant in road construction industry across India. Unless timely resolution by the functional owners of each obligation is not met, the whole team effort of achievement of final goal is defeated. One major problem indirectly impacting the timely completion of project is the high level of bureaucracy and transfer of onus by diluting the non-fulfillment of primary

obligation to other stake holders in possession of secondary obligation.

Impact Analysis through Risk Matrix

Here, the focus is on listing all the key factors that affect project completion as enlisted in one of the project sites and evaluating through risk matrix. (*Source DARP Risk Analysis – Refer Appendix B, Tables B1 to B3*)

In this, the key parameters that are critical from management's perspective are listed and reviewed at various project stages on probability and severity scales. Work plan and responsibility matrix are prepared to mitigate the parameters and built into the cost.

Findings and Conclusion

The frequency (repetitions) and severity are subject to the nature and context of the project. But it is necessary to quantify this data to evaluate the project status. Risk analysis is a potentially effective tool, and helps quantify the key parameters, which in turn helps in evaluating the current standing of project and forecasting the potential hurdles from contractor's view. Table 1 above lists the possible potential risks, which are key parameters in evaluating the project.

Present experience from on-going projects reveals that the key factors that could severely and adversely impact project completion in the order of relevance are: Land availability, Approvals

from Government authorities, Approvals of design and Drawings, Cash flows, Conflict among stakeholders, Scope Clarity (Change of Scope), Idling of Contractors resources.

Scope for Further Research

- Quantifying the severity and probability of key factors which are beyond the control of project management through analytical model.
- Validating the impact of key factors through comparative impact of same amongst key players in the market and assessing the impact in value (\$) terms.
- Enforcement of clear guidelines for each stakeholder to fulfillment of obligations.

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APPENDICES

Appendix A:

Table A1: Growth of Road Network by Categories (in Kilometres)

Road Category	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2015-16
National Highways	19811 (4.95)	23798 (4.54)	23838 (2.61)	31671 (2.13)	33650 (1.45)	57737 (1.71)	70934 (1.52)	101011 (1.80)
State Highways			56765 (6.20)	94359 (6.35)	127311 (5.47)	132100 (3.92)	163898 (3.50)	176166 (3.14)
District Roads	173723 (43.44)	257125 (49.02)	276833 (30.26)	421895 (28.40)	509435 (21.89)	736001 (21.82)	998895 (21.36)	561940 (10.03)
Rural Roads	206408 (51.61)	197194 (37.60)	354530 (38.75)	628865 (42.34)	1260430 (54.16)	1972016 (58.46)	2749804 (58.80)	3935337 (70.23)
Urban Roads		46361 (8.84)	72120 (7.88)	123120 (8.29)	186799 (8.03)	252001 (7.47)	411679 (8.80)	509730 (9.10)
Project Roads			130893 (14.31)	185511 (12.49)	209737 (9.01)	223665 (6.63)	281628 (6.02)	319109 (5.70)
Total	399,942	524,478	914,979	1,485,421	2,327,362	3,373,520	4,676,838	5,603,293

Figures in brackets indicate percent to total road length

Table A2: Total length of India's road network by type of road as on 31 March 2016

Classification	Authority responsible	Length (km)	Share of network length
National Highways	Ministry of Road Transport and Highways	101,011	1.80 %
State Highways	Public Works Department of State/Union Territory	176,166	3.14 %
Other PWD roads	Public Works Department of State/Union Territory	561,940	10.03 %
Rural roads	Panchayats, JRY and PMGSY	3,935,337	70.23 %
Urban roads	Local governments and municipalities	509,730	9.10 %
Project roads	Various State/Union territory government departments, and SAIL, NMDC and BRO	319,109	5.70 %
Total		5,603,293	100 %

(Source: https://en.wikipedia.org/wiki/Indian_road_network)

Appendix B:
Table B1: Risk Matrix (1)

	Prebid Review (Date)	Last Execution Risk Review (26.03.15)	Current Execution Risk Review (24.02.17)
Risk Rating	No. of Risks	No. of Risks	No. of Risks
Critical	4	0	0
High	5	3	2
Medium	1	2	1
Low		4	6
Total	10	9	9

Table B2: Risk Matrix (2)

Probability (P) (0 to 1) A – Most Likely More than 0.75					
B – Likely 0.50 to 0.75					
C – Occasional 0.25 to 0.5	4 (11, 12, 13, 14)	1 (3)	2 (9, 10)		
D – Unlikely 0.10 to 0.25	1 (7)	1 (1)			
E – Remote Less than 0.10					
Severity (S) (As %age of Contract Value)	V Insignificant Less Than 0.25	IV Minor 0.25 to 0.50	III Significant 0.50 to 1	II Major 1 to 2	I Catastrophic More than 2 %

Key

Critical

High

Medium

Low

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Table B3: Risk Matrix (3)

Sl. No.	Risk Element	Prebid Stage	Last Risk Review 26-Mar-15	Current Status	Current Risk Mitigation Plan	Risk Owner (Name)
1	Burrow Earth	Not Envisaged	Medium	Low	Longer duration required to obtain permission for BA. Specific team formed and longer cycle time factored in program. Major earthwork is completed.	JS/VBK
2	HMP Setup in Camp 170	Not Envisaged	Medium	Mitigated	Restrictions owing to TTZ. Plant at 107 (Higher capacity plant) is being used.	AKT
3	Delay in Land acquisition/Front Handing Over	High	High	Medium	It has been taken up with RIL on a monthly basis. 90% of land is available	RKV/AKT/SK
4	Tree Cutting	Critical	Mitigated	Mitigated		
5	Delay in Mobilization of IC	High	Mitigated	Mitigated		
6	Non-availability of ROW	High			Covered under Item 3	RKJ
7	Change in Scope	Not Envisaged	Not Envisaged	Low	Change in scope estimated submitted to client for three COS. Change order is received for COS-1 for 64 crores. Monthly claim is submitted for executed works. Payment is awaited from concessionaire.	NKK/KC
8	Change in Estimated Quantities	Critical	Mitigated	Mitigated	The qty. impact is taken into account in cost estimate.	NKK/KC
9	Govt. Royalty	Not Envisaged	High	High	The govt. royalty in UP increased from Rs. 9/cum to Rs. 30/cum for soil. The same is intimated to RIL and the cost implication for executed works is also submitted under Change in Law. Similarly, Royalty for Aggregate increased from Rs. 22/MT to Rs. 30/MT and the same was intimated to client. Claim was made upto Dec. 16	VBK/NKK
10	Fraction wise requirement of aggregates/Non-Availability of bulk materials	Medium	High	High	Due to nature of rock there is an excess generation of dust as compared to requirement. For mitigation, Mix design have been modified to consume max dust, Procurement from vendors being done for deficient fractions	NKJ/VBK
11	Cement	High	Low	Low	Escalation is reimbursable. Increase in escalation because of any unprecedented reasons is attributable to RIL.	NKK/AK/RN
12	Steel	High	Low	Low		
13	HSD	Critical	Low	Low		

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