SURVEYING AND MAPPING IN INDIA A GROUND REPORT - ISSUES PLAGUING THE INDUSTRY AT THE GRASSROOTS LEVEL AND NECESSITIES OF THE HOUR

The previous article shows the gap that existed between what is projected and that what exists on the ground zero. However, this article gives reasons for this gap and presents structurally the fault lines that plague the industry.

by M.D. Karan Cariappa

This article is in continuation to previous article which was based on experience as a Qualified Surveyor on Ground Zero.

Introduction

In my previous article, I explained in detail the ground realities of what a person seeking to be a professional can expect or hope to expect from the industry. I also brought out some ground truths about the industry that surely would have generated some interest.

Feedback on points that had been highlighted in the article have pushed me to have write a follow-up article. An article that goes a step further from story-telling and quantifies the issues plaguing the industry not in the form of numbers or finances but, an article that lists down point wise-from my point of view, the problems the industry faces, in the form of what exists and what can be.

Thus, in the following article, I have worked towards presenting structurally the fault lines that plague the industry. As I have said before, identifying and accepting the presence of a problem goes halfway in solving it, I have not delved too deep into providing solutions to

Submitted By

M.D. Cariappa
Survey and Engineer & Professional
India
Email - *kcariappa@gmail.com*

these problems. I expect the solution to these issues may be found in the discussions that are subsequently opened-up by the readers. Though many of these have been brought out and discussed earlier, some may be new to many. Many readers may not have thought about certain points before and others may also add their two bits to the listed discussion. Also, I request the readers to not go by the title of the article, "*ISSUES PLAGUING THE INDUSTRY AT THE GRASSROOTS LEVEL AND NECESSITIES OF THE HOUR*", it is rhetorical and doesn't completely encompass the issues being discussed. I have used the words in the title to generally explain the contents of the article, so please bear with me!!!!!

To get a better understanding about where we start from, you might also want to get your hands on the previous part in the link below, *SURVEYING AND MAPPING IN INDIA - A GROUND REPORT - THE PAST, THE PRESENT & THE FUTURE.*

THE GAP

In the previous article, I had explained the gap that existed between what is projected and that what exists on the ground. As we go ahead, I have listed a few of the reasons for this 'GAP'. To provide a structured understanding for the reader, I have divided this list into three categories, namely, Grassroots, Industry Level and Government or policy level. Many of the points listed below may be connected or related across categories and one may be the base reason for the other existing. But it would be important to address each of these points in their respective categories as well as a whole.

Grass-root Level

I have chosen to categorize this list of issues under the grass-roots category as it would certainly be an interesting read for youngsters and freshers planning on entering the industry. They may also glean some knowledge on gaining skill-sets in the areas that the industry requires after reading this.

- **Lack of Skill**

  Surveying and Mapping is a Line of Work completely based on the Science of the Earth and the Mathematics supporting it. To put it in other words, it can get extremely complicated sometimes and is based on concepts and theories that have been researched over the years. But as these concepts undergo constant tweaking and further development so does the science of Mapping. Thus, apart from being a line where a professional need to have strong foundations or 'fundas', as we say in the local lingo, continuous updating of skills and knowledge is also a necessity.

  Currently, most of the personnel involved in the industry are from backgrounds not related to surveying and mapping so most of the skill sets they have developed over some time are, with the time-tested methods of 'trial and error'. Though this has been an important way the industry has survived thus far, as time progresses and the industry in India gets more mature with projects demanding specialized skills becoming the mainstay in the industry, we surely need personnel and professionals with equal capability, qualifications, and knowledge in this line of work.

  My next point will shed some light on the reasons for this shortcoming and will help the reader get a better understanding of the educational ecosystem currently in place or the lack of it, in India.

- **Lack of Means for Skill Development**

  Directly related to the point I am making above is the huge vacuum that exists in this country, of sufficient training institutes, organizations and skill Development centers that can provide a person with requisite and relevant skills to make a difference in this field of work.

When it comes to providing a student or a professional with the required skill set, it has been found that the presence of an ecosystem has been found wanting. By an ecosystem, I intend to address all the levels of learning and training that are present in this industry, right from the bottom to the top, at managerial levels. Now, it would be wrong to say that, we are the only industry that suffers from such apathy in India, but being a part of this industry, we need to have more open discussions on this topic.

From the point of view, of a field data collector, I will not be wrong in saying that, there is only one Institute in the whole of the country that truly deals with all aspects of the collection of field data related to Surveying and Mapping, in the true sense. That would be the Indian Institute of Surveying and Mapping in Hyderabad, run and managed by the Survey of India, the National Mapping agency. Having been an alumnus of this institute many would blame me for being partial in my statements, but one look at their courses' structure would certainly interest a non-believer. I also agree that over the years they have fallen behind at updating their course content, but notwithstanding, when it comes to an experience of living out in the field and collecting data, the professional courses at IISM are incomparable. To provide more information on this, I will soon be coming up with an article on the course I attended and the institute.

Apart from this, there exist countless institutes offering qualifications at different levels, all over the country. But after having worked with personnel from these institutes and centers, I believe that the level of training required to handle real-life problems is just not there and this leaves a lot to cover, which is usually done once a person joins a company.

This puts undue stress on private organizations, by making them divert many of their resources to training, which otherwise can easily be used in covering productive profitable work.

- **System for Formalizing Unqualified Surveyors**

  Going Back to my previous article where I had explained the entry and existence of unqualified surveyors, I believe that this category of the workforce has made itself indispensable to the industry and if handled well, they would certainly be more of an asset than a burden, as they are currently looked upon.

  Today, surveyors holding no formal degree or educational qualifications related to mapping occupy more than 60% of the workforce in the industry. At the lower level, these are much higher. Over the years, this group of professionals has gained immense knowledge about the workings of this line. This knowledge coupled with years of roughing it out on the field has given them deep insight and understanding of the way things work, not only with equipment and documentation but also into the workings of projects, dealing with the bureaucracy as well as the general public. Many would disagree with this point, but if anyone has ever been present during a settlement exercise in a village in rural India or an event that deals with the award of compensation for the Rights of Use for a pipeline, you will certainly agree with me.

  To put matters into perspective, I wholeheartedly suggest, the formalizing of their experience in the form of a qualification, so that they may be recognized as 'made men' in this industry. This can also be used as a method to provide them with training in furthering their skills and capabilities. Currently, these surveyors do not enjoy the same status that degree holders and others enjoy, and this saddens me to a great deal because the efforts and sacrifices made by them have been no less, if not more. The details of such an exercise, of formalizing their experience, can be worked out at a later stage or may be arrived at after discussions between all the stakeholders involved, but what I would want to impress here is that the very fact is that such an exercise is needed and the faster it is done, it would be advantageous to the entire industry.

- **Surveying Being Hidden in the Shadow of Civil Engineering**

  To me this point lies close to heart and having completed my Automobile Engineering at my graduate level, I feel I possess enough credentials to back this thought process.

  When I finally moved my profession to Surveying and Mapping, the world that opened up to me was completely new and the experience was one that I had not expected at all. Having worked in the construction industry, I had expected, Surveying and Mapping to be an offshoot of Civil Engineering and Oh Boy! Was I wrong?

  To the uninitiated, Surveying and Mapping is a world and science onto itself and pairing it with any other field would not do it justice. Many Civil Engineers reading this would disagree with me, but I would not blame them for that. Civil Engineering does use a lot of Surveying, but Mapping is something that is beyond the scope of Civil Engineering to contain. Any disagreeing notions would be completely laid to rest once you have worked on a mapping project and dealt with the complications involved - Civil Engineering does not have the solutions!

  Surveying as a science needs to be brought out from the shadow of Civil Engineering and I discuss this in detail, further in the article.

- **No Clear Picture for A Fresher to Jump into The Line**

  Many new entrants in the industry face this dilemma or quandary as to what their first step must be, to enter the industry. Though I will not be discussing or providing the reader with the specifics, I have listed this point to bring to light the lack of awareness as well as a shortage of avenues (courses, degrees, qualifications, training programs, etc.) that exist in the Surveying Industry in India.

  If you would look at it, it is quite ironic, that with a national mapping agency that can be easily called the oldest structured organization to have existed in this part of the world, we in this country have very few means of identifying and recognizing paths that can help a youngster in choosing this line as his profession.

  This needs to be countered immediately. More on this further in the article.

- **Creating an Ecosystem for Others to Plug in And Out of The Survey World**

  Private, foreign players such as Google and Bing have changed the face of mapping around the world. We in India, have also not been impervious to this. Mapping today cuts across lines and fields and is used in many forms (most noticeably GIS) in many applications. Being a qualified member of this industry, I have been approached by many from outside the industry, such as UAV manufactures, coders and application developers, enquiring about the different aspects of mapping and more so, about the inner workings of the systems in place and methods to incorporate them in their line of work.

  This has made me believe, that mapping, to the outsider is still a

very difficult maze to navigate and one about which not much information exists on incorporating it with other lines of applications, especially here in India. To counter this, I believe that a system of modules needs to be put in place, in not only collection of data but also in storing and using it, so that professionals across industries can plug-in and take advantage of the resources that Surveying and Mapping provide. In today's world, this is very important and will go a long way in furthering the industry.

- **Up-grading Courses at ITI and Diploma Level**

  Many of the major mapping and surveying projects in India, that are already underway and also those that are to begin have a great deal of groundwork embedded in them and this makes the role of field-level data collecting a very important. These projects mainly include Cadastral projects, wherein, interaction is needed with every landholder, in the areas the project is being implemented. From my experience, the best kind of people who can play this role of interacting, collecting and sorting data at the primary level are ITI and Diploma holders, mostly trained in local institutes.

  Keeping this fact in mind, it has become very important for us to look at upgrading courses at the ITI and Diploma levels. More of these institutes need to train their students in the use of modern surveying equipment as well as in the use of collecting spatial and non-spatial GIS data using appropriate modern equipment. This would go a long way in ensuring the accuracy and relevancy of data collected.

- **Creating Engineering Line Specifically for Surveying Apart from Civil Engineering with Sub-Branches**

  Directly related to the point made about separating the study of surveying from civil engineering is the need to create a separate line at the undergraduate engineering level that deals specifically with Surveying and Mapping. Such a move will certainly reduce a lot of clutter and will ensure the entry of a younger, better oriented and more aware workforce into the industry.

  This will also ensure this line of work to carve a niche for itself among the major fields of technology.

Industry Level

Coming to the industry Level, I have created this category for explaining those sticking points which exist or are faced by private surveying organizations that are in the business of surveying and mapping. The reader needs to know that almost all works, jobs or contracts in the industry in India are works contracted by the government at the state and central levels. Thus, it's safe to say that the Government is the largest client that exists for the entire mapping industry in India.

This relation between Private Surveying companies and the government on the other side has been a bitter-sweet one. There have existed many problems in this working relationship, but over time both have learned to work together to generate results. In this section, I will be highlighting some points that, when viewed from the Industries side, have been pricking points and have affected the industry drastically. Some of these points are issues that need solving from the Industry's point of view and some from the government's side.

- **Discussions About the Head but Zero Work on The Feet**

  After visiting many seminars, forums and meetings held for discussing the future of Mapping in India and propagating the Industry, I have been surprised by the lack of attention given to basic problems that exist at the grass-root level. In many of these seminars, we have important matters related to subjects such as control network, datums, surveying organizations, etc. discussed, but almost nothing related to training centers, engineering streams, etc.

  Though very important, I strongly believe that apart from issues affecting the top, equal importance should also be given to issues that are not that visible in the front. As long as such issues are ignored, I believe that we will never be able to lay a strong foundation for Surveying and Mapping as a distinct and well-established line of technology.

- **Equipment Not Being India Proof or India Compatible**

  An important note made during my time spent on the field, most of the equipment coming to India is not designed for India and conditions found here. This needs to change as soon as possible with active and detailed interaction with OEMs of Survey and Mapping Equipment.

  We understand, most of the equipment being used in India is sold by western manufacturers. Recently, the use of China-made equipment has seen a surge, but the industry remains dominated by western made equipment, which as per my experience has been hardy, tough and accurate in its use and results. But, during the use of this equipment, I have also come to realize that apart from being 'Water-Proof', 'Fire-Proof' etc, this equipment misses one very important factor in its design and construction and that is 'being India-Proof'.

  To understand this one needs to understand that the conditions in India, weather, nature, etc are unique and though there have been some 'pieces' doing well, there have also been many failures due to equipment just not

being able to stand up to the rough conditions present here. I believe that OEMs need to be coerced to look at these conditions and design or re-design their equipment accordingly.

This needs to be done on the equipment side as well as on the data collection procedures. To explain this point in detail, one needs to understand that in India, the majority of the Surveying and Mapping projects are carried out for the government and though different departments may commission or order a project, the general working method remains pretty similar across different wings of the department. The formats and methods of data collection are generally the same if it's a project carried out for National Highways or Irrigation Department.

I believe that lots of time and effort can be saved if these formats and procedures are incorporated within the software of the equipment being used for data collection. In my experience, we spend/waste a lot of valuable time on converting data into formats that suit the client's needs, while this same amount of time can be utilized for production activities.

- **Equipment Being Overly Priced**

  Another complaint of business owner, especially owners of small businesses have is that Survey equipment is too highly priced, with taxes and import duties pushing up prices exponentially. It is to be noted here, that there are almost no notable organizations in India producing reliable equipment which performs in the best of form in conditions prevalent here. Due to this, we need to rely on equipment developed abroad and then imported into the country. This makes the prices skyrocket due to taxes and imports levied by the government. A direct consequence of such duties is that it makes the entry of small business owners into the industry close to impossible, due to the necessity of high amounts of capital needed to spend on equipment. Also hit are educational institutions which find it very expensive to spend on training equipment. Though there is some relief available to educational institutions, this is by no means enough or sufficient in the current state of affairs. To counter this, I believe that, the government can introduce many steps after discussing the same with industry leaders. These may include lower import duties, encouraging the refurbished equipment market, aiding companies to start R&D in India, etc.

- **No Proper Process for Getting Permissions for Carrying Out Fieldwork**

  A subsequent issue that, many private organizations face over the concern for security is the absolute haphazard and sometimes the absence of a set method for availing permissions to carry out surveys in areas deemed classified as the government. This has become a major stumbling block in starting projects and automatically adds a month to a month and a half in any project as almost all projects pan-India have a restricted area within the project AoI.

  Setting up a proper method for availing permissions and laying down time-based instructions to personnel at different levels of hierarchy can go a long way in solving these problems. Though most of these issues need to be sorted out by the government, the private sector has a major role to play as an advisor.

- **Unnecessary Security Clearances**

  One of the gifts bequeathed upon us by the British was this need of secrecy in the name of security that has become a hurdle for almost all projects being implemented, doing little in the way of actually promoting a secure environment. For private organizations, this has become an obstacle that obstructs the smooth flow of project operation and subsequently fund flow which is the lifeline of the private sector. With layers of red tape and bureaucracy as protection, no government organization or person is held accountable and most projects end up in litigation with owners and managers taking the brunt of the consequences.

  Many of these issues can be settled by reviewing and reissuing orders and notifications on data declared classified, in the past. With open-source platforms offering the same data on their platforms, one needs to see the actual advantages such an attitude has and deduce if this advantageous or detrimental to the industry as a whole.

  The reader may assume that the point being made is a minor one, but I would like to inform the reader that many projects have been delayed indefinitely or canceled as the issuing authority had not taken into account the non-availability of classified data for use by the contracted organization.

Government & Policy Making Level

Coming to the final category and probably the most important category in terms of effecting the Surveying Industry directly. These are the points and issues that are directly under the control of the government as the largest client of the surveying industry in India and also its largest beneficiary. This in many ways has also made the government the only organization that intentionally or unintentionally may act as a regulating authority within the Surveying world. Though a body of private organizations is necessary for a regulating role,

something that is not influenced by any side and works just towards the betterment of Mapping as a technological industry in the country, such a thing has not been possible thus far, due to the very position the government occupies in this whole industry, currently.

- **Need for A Data Collection and Dissemination Platform to Avoid Surveys of The Same AOI Multiple Times**
  It has been seen that due to a lack of coordination and information sharing across different departments within the government, a level of redundancy exists that has led to duplication of works, which otherwise may have been easily avoided.

  This has resulted in situations such as repeat surveys of the same area multiple times, data collected during one survey being irrelevant or insufficient for inter-departmental works, etc.

  This problem may be easily remedied in today's word if departments agree to cooperate and share data seamlessly across jurisdictions. Probably, the government is still not in a place to share data publicly, but we in the industry look forward to the day, this becomes a reality. The effects it will have on data collection and analysis will be far-reaching and almost impossible to fathom.

- **Need for The Govt. Regulation Body Institution of Surveyors to Be More Robust**
  Currently, nobody exists that may be truly called the final regulation body for the Surveying and the Mapping Industry in India. On the government side, we do have the Institute of Surveyors, but very little is known about this organization and from personal experience, it's very difficult for a person from the private world to get a membership and achieve certification from this body.

  The need for a regulating authority that decides on qualifications, standards, and benchmarks is extremely important and of tantamount importance to the development of Mapping in India.

- **Need for A Private Surveying Association That Champions the Cause of Private Surveying Companies and Surveying Professionals (Including Violence on Sites)**
  As a continuation of the above-mentioned point, I believe it is extremely important that a body exists that looks into various workplace-related problems that are endemic to this line. E.g. the violence inflicted upon surveyors in cadastral related surveys is a cause of concern and the scale at which it is perpetrated is alarming. There exist many such issues that need to be tackled proactively. The solution to these may exist through different mechanisms, but the point I am trying to raise here is that a body is extremely necessary for at least identifying and starting a discussion on such issues.

- **Need for Survey Qualified Personnel on The Government Side Handling Projects**
  Another important point that needs to be addressed, especially from the side of the government is the appointment of qualified and experienced personnel as client representatives on the client's side for GIS and mapping projects. As projects are getting more and more specialized, with aspects of a single project covering many other facets and not just map production, it has become very important to have personnel who know about the line and can clear deliveries as per schedules.

- **Government Pushing Policy to Make Projects Successful**
  Now taking it a notch higher, we come to a very subtle initiative that the government needs to take to ensure completion of Survey and Mapping projects, the record of which in my experience has been abysmally poor so far.

  The reason for so many Mapping projects to fail in this country is not just the above-mentioned points. Also contributing to this high failure rate is completely absent government policy that needs to be in place to ensure complete adherence to practices and processes that are being put in place. This may be from the protection of control points to digitization of rural cadastral maps to appointment of officials for resolution of cadastral disputes. It should be noted that, in many situations, tweaking of government policy is more than sufficient than physically policing. Such an action will also prevent inaction on the part of officials, which in my opinion is the biggest threat that looms over any project.

- **The Need for Training Projects and Modules Project-Wise to Implement as well as Maintain the Subsequent Steps of Updation**
  In India, it has become cliché to commission projects without thinking about having appropriately trained man-power for executing it and then subsequently maintaining and updating the data from a mapping project that is generated.

  This usually ends up in creating a huge dataset that is neither relevant nor accurate and once commissioned has no processes in place to maintain.

  This attitude needs an immediate change in all respects. The very inception of mapping and GIS projects needs to be planned for the ease of maintaining them, once commissioned. Training modules for persons involved in executing projects and then updating them need to be put in place, especially for major projects which have a high impact

on socio-economic conditions such as mapping projects. One might argue that this is not a role that the government needs to play, but in the absence of relevant training centers, I feel that its steps such as these that will ensure the successful execution of projects.

- **Talk of Surveying on a Much Larger Scale (Ministry of Geospatial Affairs)**
  This is a topic that is close to my heart and one that I feel hasn't been discussed enough. During my visit to many forums, Seminars, etc. I noticed very often that the conversation around the expansion of Surveying and Mapping in India, was limited to talk around Survey of India and NRSC mostly and sometimes around revenue departments of various state governments. Stalwarts of the industry often discussed on expanding the role of Surveying and Mapping in the form of collection and propagation of GIS data using modern methods. All this conversation seen and heard in seminars and meetings usually ended at no definite structure or vision that the participants would like to see this line of work materialize into.

  To me, this, in today's world is a very narrow way of looking at the advantages that mapping can present to us in the way of providing fair and efficient governance to 1/6th of the world's population. To explain my stand a little more clearly, I will have to take the reader back in time, a period that I have also written about in my first article. In the late 1700s, the British had defeated Tipu Sultan in Mysore, thus finding stable footholds in all three Presidencies in the continent. They were quick to realize the vastness of the subcontinent and soon was born the Survey of India in its earliest forms. Even at this early stage it was organized as one organization to operate within and out of the boundaries of the three Presidencies of Madras, Bombay and Bengal. The Surveys conducted by it were of immense importance and the maps and data collected by The Survey of India became the first tools for the British for administrating this huge expanse of land.

  So, I would not be wrong at saying that the British were the first at understanding and appreciating the role of GIS for governance in India. Though India was a colony and the Brits the Governors, a rule of Law applied, and many decisions taken at that time were done so after careful analysis of data and information collected during mapping and from knowledge gathered from the maps subsequently created. Just to underline the importance attached to Survey of India, I would want to state that, it was one of the few organizations that lasted almost the entirety of the British Rule in India. Also, the importance attached to it was so great that it remained as a part of the Military and was never brought under civil administration during this period. In the absence of satellite imagery and other modern methods of data collection, Survey of India was the sole means of gathering GIS data for the government of the time.

  The story after independence is completely different and probably would need another article to elucidate. Putting this aside, I have brought up this example to show how effective Geospatial Data can be in administration and governance when handled by a small group of people to use over a large populations and area. With the increase in use of GIS in Civil Administration I believe much more can be achieved than what is being done today. In order to do this, we as a community need to start advocating for responsibilities at a much higher level and larger stage than what is being asked for today.

  In my opinion, to influence issues right where they generate at the ground and at the place where solutions to them are found in the top echelons of the government, it would be perfectly in place to have an organization at the ministerial level that deals solely with geospatial affairs. Right from data collection, which may include ground data collection to satellite imagery to its analysis and propagation in the form of Maps or GIS data in a digital medium. This organization can be all that we are missing today in the world of mapping in India and can be the one point of contact that propagates valuable means of governance that bring together affective means of administration backed by the best use of GIS data. So, can a Ministry of Geospatial Affairs be a reality in this lifetime?