

## Impact Of Digital Cinematography On Craftsmanship

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### **Abstract:**

*As rightly said by Jean Luc Godard, “Cinema is truth at 24 frames per second” which means technology is inseparable from cinema. When cinema was invented in late nineteenth century, the moving images were recorded on celluloid strips. This practice continued for over hundred years, though there were intermittent technological advancements. However, within the past two decades, the celluloid has completely been out thrown by digital media and computer algorithms. Cinema as a medium has been metamorphosed altogether to a new generation. Today, there are no more celluloid nor does the camera department requires light tight chambers to change their stocks. Camera equipments and laboratories worth millions have completely been absolute. However, has it fundamentally impacted the process of motion picture photography? Has it altered the artistic imagination, crafty contributions or technical abilities of the people practising cinematography? This paper categorically aims to explore the ways in which the role of cinematographer and his visual creating abilities have been influenced due to the emergence of digital cinematography. It attempts to analyse changes in work flow, craftsmanship and challenges that have been arrived due to the above mentioned technological migration. This paper also explores the new scopes and possibilities which have emerged in this new digital visual domain.*

**Key Words:** Digital Cinema, Digital Cinematography, Craftsmanship, Celluloid, Cinematographer

**Introduction:** Since its inception, Cinema has been one of the most interesting and engaging medium of communication. Cinema is being respected as a visual language which is written through the camera. It is the image which carries the director’s idea to the audience and cinematographer is the person who works as director’s eye to create those visuals. Therefore, the cinematographer is involved at each stage of film making, whether it is the shot break up, designing of sets, selection of locations or devising creative beats (Rogers, 1998). Considering the desired audience response, the setting of shots, their tone and the entire production design shape up which gives a structure of basic visual style. In order to materialise the whole plan in to real visuals, the cinematographer carefully chooses his equipments (camera, lenses, lights, grip equipment etc.) and team (assistants, gaffer, colourist etc.). As the production goes on, a certain kind of visualization emerges which takes a final shape at the time of colour grading.

The working procedure varies significantly from project to project according to the requirement of story and narrative structure. Sometimes, the cinematographers enjoy enormous creative freedom however, other time they are just bound by the strict storyboard prepared by the director. The creative freedom is again subject to the scale of production and most importantly his interpersonal relationship with the director and the kind of trust and belief they share (Brown, 2012). So, these are the factors apart from technology which influences the cinematographer’s working style. However, irrespective of creative freedom, the cinematographer decides his camera and light position, the intensity and quality of light, the lens and the exposure to achieve the desired dramatic impulses in the visuals (Mascelli, 1998). In order to create quality images, the cinematographer requires adequate time but time is directly related to production cost which the cinematographer considers while executing his job. In this way the cinematographer plays the combined role of an artist, a technician and a businessman (Wheeler, 2012).

From the beginning, the medium used to capture images was celluloid. Though, each medium of communication and technology is subject to some amount change, with the advent of digital film

making technology, the face of cinema has been changed like never before in the past two decades. The digital process of film making is very different from that of celluloid. As mentioned above, in context of cinematography, though technology plays an integral role for the visual craftsmen, their job is not limited to technology only (Cowan, 2012). Hence this paper aims to analyse the paradigm shift in visual approach and crafty procedures which have been emerged due to this changing medium.

### **Review of Literature:**

Fair (2006) has brought forward the chronological developments in cinema technology and its impact on cinematic art form. The author has also looked upon how digital cinema has impacted the audience and their viewing experience. The article also explores various possibilities in which the conventional stigma of cinema can be re-established.

Ganz & Khatib (2006) have summarized the effects of digital cinema on film production practices. Rather than going into the technical aspects of digital film making, the authors has focused on the opportunities created by the new technology. The article has also explored the changing relationship between various entities of cinema.

Matthau (2015) has mentioned that the change in technology has taken the process of film making in a different direction. The cost and time of productions have been reduced in digital medium. The process of editing has been simplified and CGIs can be applied to digital footage in a much easier way. Distributions of cinema is taking place through Comcast and also, preservation of digital footage is much easier and cost effective than celluloid. Overall, the author is of the opinion that digital medium has all the advantages over celluloid.

Stein (2020) has argued that digital technology has changed the way movies were made and it has also altered the experience of movies as a medium of entertainment. By citing the example of a car chasing sequence of the film 'We Own The Night', the author has expressed that the sequence looks like shot in a rainy night but the rains are actually added later in the post. This has only been possible due to advanced VFX work which digital platform has offered.

Murno (2020) is hopeful that celluloid may make a comeback because in last few years the films shot in celluloid are being acknowledged in Academy Awards. Though digital has surged far ahead, it has still not achieved the visual flavour that celluloid used to deliver. The manufacturers of celluloid are in a constant effort to make a presence but the standard of laboratories is a major challenge for them.

From the review of relevant literatures it is observed that most of them have focused on the changing cinematic experience and production practices due to the arrival of digital technology in film making. However, it is hardly explored that how digital medium has impacted the process of cinematography and whether it has altered the responsibilities, craftsmanship of cinematographer in his multitasking job profile. It is also not made clear that adaptation of new technology has created what kind of issues for professionals.

### **Objectives:**

- To understand, how digital work flow of cinematography is different from celluloid.
- To examine, why digital replaced celluloid as primary medium of imaging.
- To explore the newly defined role and responsibilities of cinematographer.
- To analyse the effect of digital migration on conventional craftsmanship in cinematographic chain.

### **Hypothesis:**

- Digital Cinematography has arisen the issue of adaptability.
- Technological flexibility is diminishing the crafty contributions of cinematographer.

### **Research Methodology**

Synder (2019) describes that literature review is the founding pillar of any research study, however in an absence of a theoretical framework, many perspectives remain unexplored. If the literature studies are conducted with an exploratory approach with a specific objective then it can engender new ideas and findings in a particular field. This research study has been carried out on basis of relevant literatures such as scholarly articles, journals, interviews and online texts. Classical books on film production and recent books on digital cinema have also been referred to understand the difference in work flow.

Morgan (1984) suggests that focus group discussion is a very essential and effective qualitative research tool in modern social science studies. Focus group provides various point of views, individualistic experiences and perspectives to a special research problem which have specific underlying issues. The opinion of participants can be put together and interpreted to get an in depth insight to the research problem. This research study focuses on professional craftsmanship and industry practices in terms of contemporary digital cinematography. Therefore, the researcher found focus group discussion as an appropriate research tool to get the information about the ground reality in recent production procedure. Six young practising cinematographer in the age group of 35 to 45 who have already worked or assisted in celluloid medium and now working in new digital medium (mostly in web series, advertisements and cinemas) are included in this focus group discussion. The focus group was conducted online and the points are noted down carefully.

### **Celluloid Process of Filming**

The image forming light when falls on the photo sensitive emulsion of celluloid, it brings in a chemical change which forms the latent image. Since it is light sensitive, the film stocks were to be loaded to the camera magazine in light tight chambers. Also the cameras are need to be checked regularly for light tightness. Due to their mechanical nature, film cameras are need to be checked frequently for accurate intermittent moment, pilot pin registration and evenness of exposure for each frame. The exposed stock later on need to be processed chemically in a specialized laboratory with calibrated set of special processing equipment and chemicals. After processing, the negatives need to be printed again to get the positive or the real physical image. Film camera set up is big in size, they are expensive and along with the once usable costly raw stock and processing expenses, film production in celluloid medium is a precise and pricey affair (Gordan, 1961).

The initial films made on celluloid were without any colour and the images were in the gradation of black, white and greys. The stocks were so less sensitive that there were hardly any opportunity for the cinematographers to use light creatively, rather they were struggling to get adequate exposure. Slowly the sensitivity of the film stock improved and colour get added to it which opened up some creative opportunities for the cinematographers. However, the primary features of celluloid remains unchanged as it is a physical process of imaging; be it loading of stock to a camera magazine, developing the stock in laboratory, the negative positive process or projecting it in a theatre. It has got several stages and each stage demands a very specialized set of equipment and skilled people to handle the film stock (Hurlbut, 2020). The chain of people working in camera department were specialized in using the celluloid machinery and process. In the realm of film, nobody has imagined that the entire work flow is going to change so early and so dramatically due to the arrival of digital technology.

## Digital Gained Ground

The evolution in film making has always been subjected to the developments in camera technology. Though digital image recording technology evolved in 1970s, television industry started adopting it in mid-1980s. Towards the end of the twentieth century, Sony and Panavision collaborated to develop a video recording technology to record images like film. Sony's CCD (Charge Coupled Device) technology camera HDW-F900 was able to provide image resolution equivalent to 16mm film stock with improved latitude and colour reproduction.

During the same time, the DI (Digital Intermediate) process was introduced to film post production, by virtue of which film negatives were scanned and converted to digital footage which created the scope of non-linear editing, colour correction, compositing and VFX work with much easier process. It became a standard film post production practice. In the meantime, Sony came up with HD video format with a better resolution (1920x1080 lines) which gripped the market but it still did not match the film scanning resolution (2048x1556 lines). In HD system, the image pick up device was again CCD which could not match the latitude and colour quality of film stock; Film records more information in highlights and shadows rather than the linear HD system. Hence, HD system could not replace celluloid as the primary medium of image recording in cinema. Towards 2005, Arri, the premier film camera manufacturer came up with D20 digital cinema camera which used the CMOS (Complementary Metal Oxide Semiconductor) image capturing technology and the resolution was enhanced to 2880x2160 lines which surpassed the DI scanning resolution (James, 2006). Gradually, other players like RED, Panavision, Black Magic and Canon etc. jumped into the business. There was a momentum gathered among manufacturer to develop a digital cinema camera which can replace celluloid. In 2010, it's again Arri who came up with Alexa camera which had a similar Gamma curve like film and colour reproduction was very similar. The film industry started migrating to digital medium. The modern day full frame cameras like Sony F65, RED Monstro, Canon C700 FF & Arri Alexa LF have embraced the notion that digital cinema represents the future of acquisition. As rightly told by Michael Cioni, "Digital has now surpassed film as the recording medium of choice for main stream film production" (Mateer, 2018).

## Paradigm shift in Production and Craftsmanship

Film stocks are expensive and it can only be used once. A 400ft film magazine can record approximately 4.5 minute of rushes. Hence, before rolling the camera, the cinematographer used to ensure that everything is perfect as an NG (not good) shot can only waste the stock and mount up the production cost. Also they have to ensure that the remaining stock in the magazine is sufficient to accommodate the shot duration, otherwise they need to change the stock. So maintaining the film stock was used to be a prime job and the DOPs (Director of Photography) usually allot the job to one assistant who handles the stock. His primary job was to look after the stock duration, using the cut bits at appropriate times, sealing and labelling the film Can. Again, as film stock is light sensitive, one skilled loader or attendant used to carefully change the stock in a light tight changing bag. As the digital media (Cards/Capture drives) can be reused any number of times, it has relaxed everyone in the shooting set. An NG shot can be erased and taken again which does not imply any cost. It can run for longer duration of time which does not bother the cinematographer. As the digital image gets recorded in binary data form through complex computer algorithms, there is no fear of hiding it from light. Hence it has impacted the role of assistants, attendants and the cinematographer. In fact, it has created a new job profile of DIT (Digital Imaging Technician) who looks after the digital recording, ensures that the data is safely recorded without being corrupted and also he makes multiple copies of rushes for back up.

As celluloid was a physical process of imaging, unless the film is processed and the blue print is out, nobody was able to know what has been recorded and how are the visuals looking. Only the cinematographer sees the composition of the frames through his viewfinder during recording and he gives the opinion about the perfection of shot. Based on his lighting, lensing, camera movement and other technical aspects, he only knew the visual quality, still there pertains an uncertainty till the blue

print is out. The director and the entire crew rely on the cinematographer for the accuracy of the shooting. Later on the film cameras incorporated video assists which enabled to see the framing and focus but it did not provide any idea about the quality of the image. Hence, as far as the conformity of the shot is concerned, the responsibility of cinematographer used to be immense. However, the digital footage can immediately be played back through 3D LUT monitors and everyone can see the primary result in terms of composition, lighting, performance, movement etc. which in a way has taken away the weightage from cinematographer. As digital become an instant imaging medium, it has taken off a lot of pressure from new and inexperienced cinematographers. They are also endeavouring to take up critical challenges as they can see the result and can make the necessary changes. It has also tendered the scope to the directors and actors to interfere with the creative decisions of cinematographer.



Image. 1.1 - Film VS Digital: Changing work flow and craftsmanship

Film cameras and systems are huge and they could not be compressed into compact form. If an aerial shot was to be taken with film camera then the cinematographer has to ask for a helicopter. Rigging the camera in a helicopter and operating it was a difficult and high skilled job. However, some digital cameras are so compact in size that they can easily be fitted into a small drone and can be remote controlled. In this way it reduces the production cost and operational difficulties. Operating drone cameras is a new job profile created by virtue of digital technology.

Though the immediacy of digital medium has enabled the cinematographer to access the image immediately, at the same time the digital work flow is very different from that of the celluloid. In celluloid medium once the stock is loaded to the camera, apart from few technical things like, focus, aperture, filter, FPS (Frames per Second) etc. there were hardly any settings to be done in camera. However, in digital there are so many tools to be adjusted and readjusted to get a desired kind of visual. Deciding correct exposure was used to be a huge task for cinematographers and their assistants. An appropriate light reading along with consideration of other factors (FPS, filter, ISO, Shutter angle) were key to decide exposure. However, in digital medium the cinematographer can use tools like waveform, histogram and false colour etc. to get a correct sense of exposure, though he needs to learn the appropriate application of these tools. These days' light meters are being used just to maintain the lighting ratio. In film, the gradation of exposure and the latitude was controlled by adjusting the lighting which was taking a lot of effort from the cinematographer. However, with RAW formats, a lot of detail in highlight and shadow is available in the footage which can be managed in grading. Various camera Logs (Log C, C Log, S Log, V Log etc.) provide a variety of gradation and dynamic range which the cinematographer can choose according to his visual requirement.

With the highly increased sensitivity of digital cinema cameras, the cinematographers now have much creative freedom in terms of lighting. With a very low light, modern day cameras can produce good exposure, hence the cinematographers can play around with the quality and intensity of light. This has changed the responsibilities of the Gaffer, the person who executes the lighting plan along with the cinematographer and assistants. A lot of diffusion and reflecting materials are being used to create the scale and zone of lighting precisely. The gaffer along with electricians and light boys are adopting to this new work flow. These digital cinema cameras are equipped with multiple video outputs. By using RF transmitters in these video terminals, multiple monitor outs are available (without any cabling) to the shooting crew; mostly to the director, camera associates and focus puller. Previously the focus puller used to sit along with the DOP but with this wireless monitor and wireless follow focus kit the focus puller can sit in a convenient nearby place and can do precise focusing. So the conventional focus pullers are adopting to this new methodology.

The drastic change in work flow has taken place in terms of film processing. The exposed film stocks were required to be processed chemically through specialized labs, equipment and skilled people in order to get the final image. However, this step has been completely eliminated and digital image post production as a new department has established. Almost all the film processing laboratories and equipment worth millions of rupees have completely been closed down amounting huge loss to investors. The film manufacturing companies like Kodak, Fuji etc. have faced the same eventuality. The entire workforce working in these two industries have to face a very tough time due to this digital revolution. Many of them are jobless because they could not adopt to this new work flow. Some, who could, have kept a pace with the fast changing technology, which is again not easy for professional migrants.

Digital image post production is a vast and extended area which has imposed more responsibility on cinematographers, however, at the same time it has created a huge opportunity to manipulate the image. Colour grading provides the larger scope of experimenting with highlights, shadows, colours, contrast, brightness, skin tone, the overall look and depth etc. by virtue of which the visuals can be recreated in this stage with a whole set of new flavours. Many shooting errors can be eliminated and new grades can be applied in grading. Composition used to be a very important visual tool for the cinematography which impacts the visual aesthetics greatly. Though it is still relevant, at the stage of

grading the frames can be cropped and recomposed also which gives some amount of compositional freedom to the camera operators. They can keep the frames a little wider which can be made compact in the post production stage. Manipulating ‘Depth of Field’ was another very crafty and skilled job of cinematographer for which they used to do the permutation and combination with lens, aperture and light intensity, however, in digital, the depth of field can be tweaked accurately at the stage of image post production which makes the skill of a craftsman; the cinematographer, less imperative. With digital footage, VFX work has been very compatible and created enormous opportunity. A back light can be added, glare/ flares can be added or grains can be removed. A new object can be created or removed. Movement can be created in static frames. Through compositing, mountains, deserts or rivers can be created in the background and so on. Skies can be made blue and clouds, sun moon and rain can be added later (Perisic, 2000). Hence digital cinematography has created a data centric work flow in which cinematographers are busy in understanding that what technology can offer rather than creating it in a real shooting set with all their traditional craft, skills and innovative ideas.

### **Verification of Hypothesis**

From the above discussion it is observed that cinematography is a chained process composed of several stages from planning, shooting to post production. At each stage, along with cinematographer, there are a set of specialized people who possess special skills are involved to accomplish the work; be it the stock loader, gaffer, assistants, focus puller, lab technicians or colourist, all of these people have witnessed a change in their job profile and alteration in their craft. Some of them have adopted to the new changing technology whereas few of them are job less. Even few veteran cinematographers also could not cope up with the new technology and they are no more in practice. Hence, Hypothesis-1 which says “Digital Cinematography has arisen the issue of adaptability” has been proven to be valid.

Starting from setting a correct exposure for a scene to compose the frames nicely or producing a good dynamic range through thoughtful lighting are very important aspects of crafty cinematography and the cinematographers put their effort, experience and hard learnt skills to achieve them in their visuals. Manipulating depth, creating a special tone through lighting etc. are also requires cinematographer’s craft. As mentioned above, digital is a data centric work flow and it provides a lot of scope to produce desired crafty cinematographic impacts in camera and in post- production. The cinematographers are now become data scientists and learning the new medium and its scopes and opportunities rather than practising the conventional crafty creativities. Hence, hypothesis-2 which says “Technological flexibility is diminishing the crafty contributions of cinematographer” is found to be true.

### **Conclusion:**

It is broadly observed that digital technology has reached to a point where it has significantly changed the film production practices. The physical images of celluloid strip have been replaced by data centric algorithms. The digital image can now be converted to several formats according to the need for various stages of production and later on as per the requirement of various display platforms. For example; DPX files are required for colour grading and visual effects, but low resolution quick time files are enough for editing purpose. A film these days are being watched on several platforms such as in a theatre screen, in home television, computers, tablets and mobile phones. Hence the project exports are being made on several formats like DCP, MOV, MP4 etc. Computer and software specialists are stealing away the mechanical work flow. The production staff, their job profile and the process is changing. The only way forward is to adopt and emerge.

Though new roles, procedures and practices are now being infused with the several stages of cinematography, the fundamental role of cinematographer as a visual artist has not altered much. He has to do his script interpretation, lighting design, visualization of shots and scenes, choosing a lens or planning a movement; all these as his prime responsibility. The magic of dramatic lighting or a lyrical movement has yet not replaced digitally. Only digital has marginalized few of the crafty

abilities of camera team and enforced the task of learning encrypted image on them. In order to achieve visual creativity, the cinematographer has to focus more on data capturing rather than conventional crafty techniques. From silent monochrome era to modern day 3D and VFX era, if film industry has witnessed anything then that is change. Digital cinematography is yet another milestone in this direction. It has subjected everyone, from the manufacturer to the practitioner to a lot of learning and adaptation. No doubt it has affected the craftsmanship of cinematographer but his creative tools will continue to create visual splendour.

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