A Cost-Effective Post-Production Workflow and Equipment Chain for Independent Filmmakers

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Abstract

This study investigates a low-cost post-production workflow and equipment chain that meets the financial constraints of the Sri Lankan film industry while maintaining industry standard visual quality. Post-production represents a significant amount of the production costs, often challenging independent and student filmmakers and other low-budget productions. The research identifies current post-production systems, evaluates their costs and standards, and explores human audio-visual perception to identify an affordable alternative. The proposed system incorporates a cost-effective combination of hardware and software optimized for efficient editing, color grading and creating DCI-recommended outputs. The workflow emphasizes streamlined processes including proxy-based offline editing, high-resolution confirmation, and final delivery to expected quality. The system and workflow were validated through the audio-visual content and a comparative analysis with two alternative versions. Focus group feedback assessed technical parameters such as brightness, contrast, color accuracy and emotional impact. The results show that the proposed workflow outperformed its counterparts by providing high-quality outputs within tangible constraints and budget constraints. The study concludes that the proposed workflow offers a practical solution for the film industry in Sri Lanka, balancing affordability with visual satisfaction. However, given the rapid evolution of post-production technology and artificial intelligence, continuous adaptability is essential to ensure long-term relevance and sustainability.

***Keywords**:* Post-production technology, audio-visual perception, cost-effective Post-production.

Introduction

In the film production process, post-production plays crucial role in shaping a film's final output. It is a multifaceted process that includes editing, sound

design, color correction, visual effects (VFX) and mastering. For independent filmmakers, the post-production phase can often be a significant challenge, involving significant financial and technological investments (Bordwell & Thompson, 2004). However, digital technologies and innovations in post-production software and hardware have led to the democratization of filmmaking tools, allowing independent filmmakers access to high-quality post-production facilities at lower costs. Despite this, the challenge of managing high production costs remains, especially in emerging film industries such as Sri Lanka (Perren, 2012). The purpose of this study is to explore how independent filmmakers can use innovative post-production workflows and equipment chains to reduce costs while maintaining industry standards.

The rapid evolution of post-production technology has transformed traditional workflows. In the past, cutting physical film strips in film editing was a tedious and time-consuming process. With the advent of digital editing technologies, the entire process has become more streamlined and cost-effective (Dancyger, 2011). Modern digital editing tools such as Avid Media Composer, Final Cut Pro, and Adobe Premiere have become the industry standard, giving filmmakers more flexibility in their workflows and reducing the need for expensive physical media (Brown, 2016). Moreover, the rise of cloud computing and storage solutions has made it easier for independent filmmakers to access powerful software remotely, thereby reducing the need for expensive on-site infrastructure (Gibson, 1966). These technological advances have not only made post-production more affordable but have also allowed filmmakers to maintain a high level of creativity and quality in their work.

However, despite these innovations, high post-production costs plague many independent filmmakers, especially in countries like Sri Lanka where budgets are often limited. According to Bordwell and Thompson (2004), post-production typically represents a significant portion of a film's total budget, which can be a daunting reality for small-scale productions. Furthermore, the increasing complexity of post-production tasks, such as 3D rendering, color grading, and advanced sound mixing, require specialized expertise and equipment that further increases costs (Holman, 2010). The need for high-end technology such as Dolby Atmos for sound design and specialized visual effects software makes it more difficult for independent filmmakers to meet

professional standards without overspending (Jackson, 2014).

To address these challenges, this study seeks to identify cost-effective alternatives to traditional post-production workflows. A critical component of this research will be to evaluate current post-production practices in Sri Lanka and assess how new, affordable solution can be integrated into existing workflows without compromising quality.

The research question addressed in this study is whether alternative production techniques can significantly reduce production costs without compromising the viewing experience. High post-production costs are particularly burden for the Sri Lankan film industry, sometimes limiting creative capability and narrowing the access to advanced technology. Facing this challenge, the research attempted to balance cost-effectiveness of the post production aspect with audience satisfaction.

To achieve this, the study focused on several objectives: to identify the current post-production equipment and technology in Sri Lanka, the standards and associated costs, and to find out the audience's basic cognitive ability in understanding audio-visual content. The aim was to validate the finished output with a technical team using a strict fixed control system, propose and test alternative solution for film post-production. This comprehensive approach ensured that the proposed solutions were both practical and aligned with industry and audience expectations.

The theoretical frame of this research is based on two main theories: Human Perception and Image Quality Model and Media Richness Theory. The Human Perception and Image Quality Model explores the limits and capabilities of human visual perception with an emphasis on how audio-visual outputs are experienced and evaluated by audiences. This model ensures that the proposed post-production workflow aligns with the perceived constraints, delivering content that maintains high quality without exceeding unnecessary technical specifications. Media richness theory, on the other hand, focuses on the effectiveness of communication through different media formats, highlighting the importance of clarity, immediacy, and richness in conveying information. Together, these theories provide a robust framework for optimizing the balance between quality, cost and audience engagement in audio-visual content creation.

In summary, while advances in technology have made post-production more accessible, independent filmmakers still face significant challenges in

managing costs. This research will examine the intersection of post-production technology, cost reduction, and workflow optimization, ultimately proposing a model that can assist filmmakers in navigating post-production complexities while maintaining high quality standards.

Literature Review

Film Post-Production Technology

The history of film post-production is intrinsically linked to the broader technological advancements within cinema. Initially, the post-production process involved manual techniques, which were time-consuming and labour-intensive. Early post-production primarily consisted of cutting and splicing physical film stock, a practice pioneered by editors like Edwin S. Porter and his innovations in editing and narrative structure (Crafton, 1999). This early form of post-production was vital in shaping narrative cinema, and its development marked a significant shift from the rudimentary days of filmmaking to a more refined process.

In the early days of cinema, the post-production process was rudimentary. Filmmakers physically edited the film stock by cutting and splicing it to create the desired narrative flow. According to Bordwell and Thompson (2004), this technique of film editing remained the standard until the mid-20th century. With the advent of more sophisticated technologies, filmmakers began to experiment with sound and color, adding another layer of complexity to post-production (Bordwell & Thompson, 2004).

Early Film Post-Production

In the early 1900s, the use of editing machines such as the Moviola, a hand-cranked editing tool, allowed editors to work with film stock more efficiently. These early devices were critical to the development of the film industry, enabling editors to splice and reassemble scenes. Early film editing focused heavily on the practical needs of the filmmaker, ensuring that footage could be pieced together to form a coherent narrative (Reisz & Millar, 2010). This process remained fully manual until the digital revolution, which transformed the method of editing.

Linwood G. Dunn's innovations in film editing technology during the early 20th century revolutionized the industry. Dunn's work in developing the first optical printers and his advancements in film development (VFX)

techniques helped to streamline post-production workflows (Gomery, 2005). These developments were pivotal, providing filmmakers with greater flexibility and precision in editing, sound synchronization, and color correction.

Edwin S. Porter's early experiments with editing and storytelling in cinema, particularly his work with the "Mapport" editing technique, were critical in establishing the grammar of cinematic storytelling. Porter's contributions to the development of editing conventions and the synchronization of film and sound set the stage for the more advanced technologies that would follow (Musser, 1991). His innovations marked a shift toward the use of editing as a tool for shaping narratives rather than just technical adjustments.

With the development of sound technology in the 1920s and 1930s, film editing technology evolved to accommodate the synchronization of sound and image. This era saw the emergence of more sophisticated editing machines that could handle both film stock and sound tape. The integration of sound into cinema brought about a shift in the way post-production processes were conceived, requiring new approaches to editing, mixing, and dubbing (Gomery, 2005).

Introduction of Digital Technology for Editing

The introduction of digital editing in the late 20th century fundamentally changed the post-production landscape. The move from analog to digital editing provided filmmakers with greater flexibility, speed, and precision (Dancyger, 2011). Digital non-linear editing (NLE) systems, such as Avid Media Composer and Adobe Premiere Pro, revolutionized the editing process by allowing filmmakers to cut, paste, and rearrange scenes on a computer screen without the need for physical film (Brindle, 2014). This advancement eliminated many of the constraints imposed by traditional film editing and opened up new creative possibilities.

As digital editing systems became more widely adopted, filmmakers began to integrate multiple media sources, such as digital video, computer-generated imagery (CGI), and traditional film footage, into a cohesive post-production workflow. This shift to intermedia workflows has allowed for the seamless blending of different formats, leading to more sophisticated visual effects and higher production values in modern films (Goulekas, 2001).

Negative plate engraving, which was once an essential part of film production, gradually became obsolete as digital tools took over the role of combining and manipulating film elements.

The integration of sound into cinema is one of the most significant technological advancements in film history. Initially, films were silent, and sound was added later in the post-production process. With the advent of synchronized sound technology, filmmakers could now combine speech, music, and sound effects in ways that significantly enhanced the cinematic experience (Gomery, 2005). The introduction of multi-track sound systems and the eventual development of digital sound mixing technologies, such as Dolby Atmos, further elevated the role of sound in post-production (Jackson, 2014). These advancements enabled the creation of more immersive audio-visual experiences.

Color processing in film has also evolved significantly over the years. Early color films were created using techniques like hand-tinting and stenciling, but these were labor-intensive and expensive processes (Rickitt, 2007). The introduction of Technicolor in the 1930s marked a major leap forward in color processing technology, offering filmmakers the ability to produce vibrant, full-color films (Belton, 1992). Over time, the process was refined, and new techniques, such as digital color grading, replaced older methods.

The development of color mixing technologies, including the digital manipulation of color during post-production, has been one of the most important advancements in modern filmmaking. Digital color grading software, such as DaVinci Resolve, allows filmmakers to make precise adjustments to color tones, saturation, and contrast, giving them greater control over the visual aesthetic of their films (Hullfish, 2013). This level of control has made color correction a crucial aspect of the post-production process, helping to achieve the desired look and mood of a film.

In the digital age, the range of technologies available for post-production has expanded beyond editing and sound design to include advanced visual effects (VFX), color grading, and 3D rendering. The use of digital tools to enhance visuals and sound has become standard practice in the industry, with technologies like CGI and motion capture enabling filmmakers to create immersive worlds and characters (Goulekas, 2001).

In modern post-production, broadcasting and the incubation of content play crucial roles in the distribution and preparation of films for wide release. The process of broadcasting involves the conversion of films into formats suitable for television, streaming, or cinema. This step is integral to ensuring that the final product reaches its intended audience. Incubation, on the other hand, refers to the testing and feedback phase, where test audiences are used to gauge the effectiveness of the post-production decisions, particularly in terms of pacing, sound, and visual appeal.

Digital Post-Production Workflow

Digital post-production workflows have revolutionized how films are made. The DCI (Digital Cinema Initiatives) standard is one such milestone, which ensures that digital films meet the technical standards for theatrical exhibition (Perren, 2012). Modern filmmakers use various digital tools in tandem to create seamless post-production workflows, from initial editing through to final mastering. These workflows involve collaboration across different departments, including editing, color grading, sound design, and VFX, all of which rely heavily on digital technologies for efficiency and quality.

The DCI standard has played a pivotal role in the adoption of digital cinema by major studios and independent filmmakers alike. It ensures that digital films are compatible with projection systems worldwide and helps streamline the distribution of films across theaters and digital platforms. For independent filmmakers, the DCI standard offers a pathway to high-quality cinema presentation at a fraction of the cost of traditional film stock (Bordwell & Thompson, 2004).

Modern sound mixing technologies, such as Dolby Atmos, have raised the bar for audio-visual experiences. Dolby Atmos allows sound to move freely around the audience, creating a more immersive experience than traditional surround sound systems (Jackson, 2014). This technology has become standard in high-budget films and has begun to permeate independent filmmaking, offering filmmakers the tools to create professional-quality soundscapes on smaller budgets.

Post-Production Technology and Cost

The evolution of post-production technology has also brought significant changes to the cost structure of filmmaking. While early filmmaking required expensive film stock and elaborate equipment, the advent of digital technologies has reduced these costs substantially (Dancyger, 2011). However, as the complexity of post-production tasks increases, the cost of high-end equipment and software remains a significant factor for filmmakers, particularly those working with limited budgets (Holman, 2010).

The costs associated with modern post-production technologies are a critical concern for filmmakers, especially in developing markets. High-end software and hardware, such as advanced color grading tools and 3D rendering systems, come with steep price tags, which can be prohibitive for independent filmmakers working on low budgets (Goulekas, 2001). Despite the affordability of some tools, the cumulative cost of digital post-production can still place a significant burden on filmmakers.

In high-budget productions, the cost of post-production often exceeds other stages of filmmaking. Case studies of major films show that a substantial portion of the budget is allocated to post-production tasks such as editing, sound mixing, and visual effects (Brownlow, 1979). These costs are often absorbed by the production company, which has access to advanced technology and a large team of specialists.

Despite the high costs associated with post-production, this phase remains the most creative and transformative stage of filmmaking. It is during post-production that filmmakers can refine their vision, enhance performances, and fully realize the artistic potential of the film. As Brownlow (1979) argues, post-production is the phase where the "raw material" of the film is sculpted into a finished work of art.

Global Trends in Low-Cost Post-Production

In recent years, the global film industry has witnessed significant shifts in post-production practices. These changes have been largely influenced by technological advancements, economic pressures, and the increasing accessibility of digital tools. Independent filmmakers, particularly those operating within constrained budgets, have been quick to adopt innovative approaches to achieve professional results without incurring high costs.

One of the most notable trends in low-cost post-production is the democratization of technology. High-quality editing software such as DaVinci Resolve, Adobe Premiere Pro, and Final Cut Pro X are now available at affordable prices or even for free in some cases. These tools offer a suite of advanced features, including color correction, sound editing, and visual effects integration, which were once reserved for high-budget productions (Goulekas, 2001). Furthermore, cloud-based platforms like Frame.io and Adobe Creative Cloud enable collaborative workflows, allowing teams from across the globe to work together seamlessly.

Another emerging trend is the use of artificial intelligence (AI) and machine learning in post-production. AI tools such as Adobe's Sensei and Runway ML are increasingly being utilized for automated editing, noise reduction, and even generating special effects. These technologies reduce the time and labor traditionally required in post-production, enabling filmmakers to focus on creative decisions rather than technical challenges (Xyzparis.xyz, 2023). Additionally, AI-powered tools are being used to upscale low-resolution footage, further expanding the possibilities for filmmakers working with limited resources.

The adoption of open-source and alternative software is also gaining traction. Blender, an open-source 3D animation and compositing tool, has become a popular choice for independent filmmakers and small studios due to its robust features and lack of licensing costs. Similarly, Audacity is widely used for audio editing in low-budget projects. The open-source community fosters a collaborative ecosystem where filmmakers can access tutorials, plugins, and support to enhance their workflows (Alexis Van Hurkman, 2014). Hardware advancements have also played a crucial role in low-cost post-production trends. Modern computing devices, including laptops and compact desktop setups, now have the processing power required to handle high-definition video editing and rendering. External GPU (eGPU) solutions further enhance processing capabilities, allowing budget-conscious creators to work with 4K or even 8K footage without investing in expensive workstations (Brindle, 2014).

In the sound domain, innovations like Dolby Atmos provide immersive audio capabilities at increasingly accessible price points. Affordable tools such as iZotope RX enable detailed audio cleaning and mixing, which were traditionally done in high-cost studios (Jackson, 2014). Sound editing,

previously a separate and expensive process, can now be integrated into the overall post-production workflow using comprehensive digital tools.

Global outsourcing is another trend shaping low-cost post-production. Filmmakers in countries with high production costs increasingly collaborate with professionals in regions where post-production services are more affordable. For example, countries like India, the Philippines, and Eastern Europe have emerged as hubs for cost-effective post-production, offering skilled labor for editing, VFX, and sound design at competitive rates. This trend is facilitated by high-speed internet and cloud-based file-sharing platforms (Perren, 2012).

Lastly, the rise of remote working has transformed how post-production teams operate. The COVID-19 pandemic accelerated the shift to remote workflows, pushing the industry to adapt quickly. Tools like Zoom, Slack, and collaborative editing platforms are now staples of the filmmaking process. These technologies allow filmmakers to save on physical studio space and travel expenses, making low-cost production models more viable (Xyzparis.xyz, 2023).

The convergence of these trends illustrates a promising future for filmmakers working within financial constraints. As technology continues to evolve, the accessibility of professional-grade tools and workflows will only increase, empowering creators worldwide to produce high-quality content on limited budgets. These advancements also highlight the importance of adaptability and innovation in navigating the dynamic landscape of global film industry.

Methods and Methodology

The methodology for this research aimed to evaluate the post-production technology used in Sri Lanka, and to develop a low-cost alternative post-production workflow that maintains a enough-quality audio-visual output within the limits of human audio-visual perception.

The study is rooted in constructivism, which emphasizes that knowledge is actively constructed through interactions and experiences. This approach aligns with the goal of understanding and improving post-production practices by directly engaging with the tools, workflows, and outcomes within real-world contexts.

The research adopted an inductive approach, focusing on deriving insights from specific observations and experiences to form broader conclusions. By analyzing the technical processes and their outcomes, the study aimed to construct an optimized, cost-effective post-production workflow based on empirical data.

A qualitative research method was employed to provide an in-depth exploration of the complexities of post-production practices. This method allowed for a detailed analysis of the workflows, tools, and outcomes, considering both technical and perceptual factors.

The study utilized a case study strategy to analyze post-production practices within the Sri Lankan context. The case study approach provided a detailed examination of the identified workflow and equipment chain, offering insights into the practical challenges and potential improvements.

To validate the proposed low-cost post-production workflow and equipment chain, an audio-visual (AV) content piece was created. This content was developed using the identified workflow and tools, adhering to the quality standards determined during the research process.

The created content was tested with a focus group to assess its effectiveness in delivering quality audio-visual output which can be entertain. The focus group consisted of carefully selected individuals who represented potential audience members.

The AV content was shown to the focus group in a controlled environment, ensuring that all participants experienced the same technical and perceptual conditions.

1. **Questionnaire Feedback**
   After viewing the content, the focus group participants were provided with a structured questionnaire. The questionnaire was designed to capture their feedback on various aspects of the AV content, including Colour, Brightness, Contrast, Image clarity, and overall impact.

2. **Discussion Sessions**
   Following the completion of the questionnaire, participants engaged in a guided discussion to elaborate on their feedback. These discussions provided valuable qualitative data, revealing deeper insights into the strengths and limitations of the proposed workflow.

Thematic analysis was used to analyse the feedback gathered from the focus group. This method involved in identifying recurring themes and patterns in the data, which were then used to evaluate the effectiveness of the proposed low-cost post-production solution. The analysis helped determine whether the workflow met the desired quality standards and identified areas for further improvement.

In summary, this methodology combined constructivist philosophy, an inductive approach, qualitative research, and thematic analysis to explore and validate a cost-effective post-production workflow. The creation and testing of AV content ensured that the findings were grounded in practical outcomes, contributing to the development of a practical and viable alternative for the Sri Lankan film industry's post-production needs.

Results and Discussion

Audio Visual Perception and assessment of Image Quality

The foundation of film technology is deeply rooted in human audio-visual perception, particularly phenomena like persistence of vision and the phi phenomenon. Persistence of vision, first described by Peter Mark Roget, is the optical illusion where the human eye retains an image for a fraction of a second after it disappears, allowing for the seamless perception of motion in rapidly displayed frames (Bennington and Gay, 2006). Complementing this is the phi phenomenon, identified by Wertheimer (1912), which explains how the brain perceives continuous motion when viewing a series of static images in rapid succession.

Optical illusions occur when the brain misinterprets visual information, often leading to a distorted perception of reality. These illusions can affect how viewers perceive image quality, particularly in film and media. For instance, illusions such as the "Müller-Lyer" effect, where two lines of equal length appear different due to the surrounding arrows, demonstrate how contextual cues can alter the perception of spatial relationships. Similarly, the "brightness contrast illusion" can cause the brain to perceive objects as brighter or darker depending on their surrounding light, even when they are the same. These phenomena affect how viewers experience images in films, as the brain may process visual elements differently based on perceived contrast, depth, or movement, thus influencing the overall perceived quality of the image (Gregory, 1997; Palmer, 1999). In film post-production,

understanding these illusions is crucial for color grading and visual effects, ensuring that the intended visual message is accurately communicated to the audience.

Technology and Cost of Post production in Sri Lankan Film Industry

The technology budget for post-production in Sri Lanka varies widely depending on the scale of the production and the specific tools used by the post-production team. Through interviews with five technicians and observing their post-production systems, it became clear that industry-standard software and high-performance hardware are essential to achieving the desired quality of the final output. The technologies employed in the post-production workflows include Avid, DaVinci Resolve, and Adobe Premiere Pro, which are widely recognized for their advanced editing and color-grading capabilities.

Avid Media Composer is a professional non-linear editing (NLE) software that is frequently used in larger film productions. It provides powerful media management features and supports complex editing workflows, making it a preferred choice for editors working on feature films and television series. DaVinci Resolve, primarily known for its color grading functionality, is also widely used for editing and post-production in the Sri Lankan industry. Its advanced color grading features enable filmmakers to achieve cinematic color correction, giving their films a polished, professional look. Adobe Premiere Pro, which is also used by some technicians, is known for its flexibility and integration with other Adobe Creative Cloud tools, making it a popular choice for smaller-scale productions.

The technicians observed in this study also rely on high-performance workstations to handle the demanding computational tasks required for film editing, color grading, and visual effects work. The most commonly used machines include high-capacity Windows-based workstations and Apple Mac Pro workstations. These systems are equipped with powerful processors, large amounts of RAM, and graphics cards designed to handle the processing power required for professional post-production. Additionally, efficient storage solutions are integral to the workflow, as post-production often involves handling large video files that need to be accessed and edited in real time. Many technicians use RAID (Redundant Array of Independent Disks) storage systems, which provide high-speed data transfer and redundancy to protect

against data loss.

Based on the interviews and observations, the total budget for post-production technology in Sri Lanka ranges from 9.5 lakhs to 15 lakhs Sri Lankan rupees. The variation in budget is mainly due to the scale and complexity of the production, as well as the specific hardware and software configurations chosen. The higher-end systems, such as those using Avid Media Composer and DaVinci Resolve with recommended workstation computers and storage solutions, are typically found in larger, more commercial projects that require greater processing power and storage capacity. On the other hand, smaller, independent productions may rely on more affordable software like Adobe Premiere Pro and less powerful workstations, which bring down the overall cost of post-production.

These costs represent a significant portion of the overall production budget, particularly for independent filmmakers working with limited resources. While these industry-standard tools and systems are essential for achieving high-quality results, the financial constraints of independent filmmakers in Sri Lanka highlight the need for more cost-effective solutions. In the face of rising technology costs, it is increasingly important for filmmakers to explore alternative post-production workflows that maintain a balance between quality and affordability, allowing them to achieve expected output without exceeding the budget.

Focus Group Feedback Analysis

The focus group provided valuable data into the technical and experiential aspects of the content produced using the proposed low-cost post-production workflow and equipment chain. The analysis revealed strong evidence supporting the feasibility of this approach while identifying areas for improvement. Three primary parameters image quality, content experience, and emotional impact were evaluated and compared across three different versions of the same content (A, B, and C), where "A" represented the content created using the proposed system.

Image Quality

The feedback on image quality emphasized key elements such as brightness, contrast, sharpness, and color accuracy. Among the three versions, content "A" received the highest preference, demonstrating superior sharpness

and resolution. Participants noted that the brightness and contrast levels in "A" were balanced, ensuring clarity without overexposure or loss of detail. The color accuracy was highlighted as a strength, as the proposed workflow incorporated LUT locking and color smoothing processes, effectively minimizing discrepancies and ensuring consistent reproduction. While participants acknowledged some minor limitations in achieving ultra-high resolution outputs, these were within acceptable perceptual limits and did not interfere with the viewing experience.

Content Experience

Feedback on overall content experience was mixed but leaned toward positive responses for "A." Participants described the content as engaging and immersive, with effective synchronization between audio and visual elements. By contrast, versions "B" and "C," created using alternative workflows, were noted to have inconsistent image quality and less engaging narratives. Suggestions from the focus group included further refinement of raw footage during production to enhance the integration of post-production effects. These insights highlight the importance of maintaining a balance between technical quality and creative storytelling to sustain viewer engagement.

Emotional Impact

The emotional impact of the content was a critical factor in the evaluation. Content "A" evoked stronger emotional reactions compared to the other versions, attributed to its clearer and sharper images. Participants reported that the high technical quality heightened their cognitive and emotional connection to the narrative, reinforcing the importance of technical excellence in influencing audience perception. In contrast, technical weaknesses in versions "B" and "C" detracted from the immersive experience and reduced the overall emotional impact.

Conclusion and Remarks

This study investigated the development of a low-cost post-production workflow and equipment chain tailored for the Sri Lankan film industry. The aim was to address the high costs associated with traditional post-production processes while ensuring the quality of audio-visual outputs met professional standards. Through analysis of current practices and feedback from focus

group evaluations, the proposed system was found to be both cost-effective and practical.

The proposed system configuration balances affordability with performance. It features a workstation powered by an 8-core Xeon processor and 32 GB of RAM, enabling smooth multitasking and efficient handling of complex editing tasks. Dual 1 TB SSD drives provide ample storage and high-speed media management, while an Nvidia GeForce GPU with 8 GB VRAM ensures robust graphics processing and accurate color output. The system also incorporates high-quality IPS monitors for precise color calibration

The workflow is designed to optimize efficiency at every stage of post-production. It begins with proxy generation in DaVinci Resolve, allowing offline editing on lower-spec systems. Once editing is finalized, the workflow transitions to full HD or 2K resolution for color grading, leveraging the system's hardware to achieve accurate and visually appealing results. The final stage involves upscaling the edited content and creating a Digital Cinema Package (DCP) using DCP-o-Matic, ensuring compliance with cinema projection standards. This streamlined workflow minimizes costs while maintaining technical excellence.

Feedback from the focus group evaluations confirmed the effectiveness of the proposed system and workflow. The content produced using this configuration consistently outperformed alternatives in parameters such as image sharpness, color accuracy, and overall emotional engagement. Participants highlighted the system's ability to deliver high-quality outputs while acknowledging the importance of strong raw footage and creative storytelling to enhance the final product.

In conclusion, this study demonstrates that a cost-effective post-production workflow can significantly benefit the Sri Lankan film industry, enabling filmmakers to achieve professional results without incurring prohibitive expenses. By adopting the proposed system and workflow, independent filmmakers and low-budget productions can overcome financial constraints while maintaining high standards of quality. Future work should focus on further refining raw footage preparation and increasing awareness of technical standards to maximize the workflow's potential for industry-wide adoption.

In the context of rapid technological advancements and increasing integration of artificial intelligence (AI) in the film industry, ensuring the long-

term relevance of these findings presents a significant challenge. While the proposed workflow is effective and accessible today, evolving technologies may require ongoing updates to maintain its viability. Therefore, this study's recommendations should be viewed as a flexible foundation rather than a fixed solution, encouraging filmmakers to adapt and integrate emerging technologies to sustain their competitiveness and creative potential in the local industry.

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