

# Special Effects Spectacle: The Technical Design Effectiveness in Musical Theatre

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Musical theatre production increasingly becomes the focus in the present across Malaysia with the engagement of the diversity of producers internationally. The variety of the factors behind the musical performances indirectly provides traction and lifting uniqueness towards its spectacle's technical effects. Yet, on that point is less attention was exposed through the theatre production process in the context of technical designing of special effects. This is due to the lack of practitioners that lead to researching on technical for theatre in Malaysia. To this end, research on the special effect's invention done is to examine the technical components and approach in resulting impact of visualisation and conceptualisation. The case study on three musical theatre performances at the national theatre of Istana Budaya - Aladdin the Musical (2007), Puteri Gunung Ledang the Musical (2006) and Cats the Musical (2002), is to help in providing guidelines also solutions in the technical design process for theatre performances.

**Keywords:** *Production process, Stage effects, Technical theatre, Musical performance, Scenography.*

## Introduction

"Theatre activity is currently regarded as one of the least predictable, quantifiable or determinable of human activities. Yet it is certainly not without precedence, and the form of building or places designed to cater for the theatre activities often results from blind

obedience to an archetypal image formed at a time when such activities were considered more predictable" (Barlow, 2018, p. 135).

Theatre performance involves text, directors, performers, designers and managers and production team. It is also about visual presentation and stage or spatial environment as performance design concept. In the process of visualising the effectiveness production design concept for theatre performances, technical design for special effects is required.

Technical Design of Special Effects (TDSE) is some mechanical or technical visual and pictorial suggested ideas by writer and creatively generated by director and designers in a production. It is a creation of displaying a solving idea and solution in a different, unique and able to deliver the message of the story by bringing a greater presentation impact beautifully. Theatre staging in Malaysia had begun to flourish with a diversity of genres. Many activist groups comprising the professional and amateur also comes with the published theatre production of the various concepts and the shape on the stage or auditorium that contained around Kuala Lumpur. The emergence of contemporary theatre forms becomes an option in creating a new disorder in the theatre industry in Malaysia. The contemporary theatre, which is often performed in Malaysia, starts refining forms of genre or applying the addition of structure than the original form to another. Experimental theatre or modern theatre is a contemporary theatre between the growing opportunities and got the attention of theatre enthusiasts in Kuala Lumpur.

There is a new scenario that also same goes directly where the musical theatre genre is growing and always gets the attention especially at *Panggung Sari, Istana Budaya* or also known as the Palace of Culture – The National Theatre. *Panggung Sari* is *Istana Budaya's* main theatre stage which was known as the most advance stage in Malaysia, who supplied the technology or facilities built in with an automation concept. Eni and Osuya (2013) stated that "technology is in constant flux, a constant state of evolution. Radical attitudes towards the use of technology in the theatre have characterised modern approaches to the theatre activity" (p. 352). Since, *Panggung Sari, Istana Budaya* supplied the stage technology evolution, the musical theatre performances staged at *Panggung Sari* must also consider all aspects in technical designing and special effects to produce uniqueness or spectacles.

To ensure that musical contemporary theatre performances provide the effectiveness in the show, it is important to study the needs and the process of designing technical of special effects. In regards to that, this research focuses on the technical elements of special effects to analyse the design process and application of the musical theatre scripts, materials, methods of implementation, energy resources and the resulting impact of visualisation and conceptualisation. Research by Hashim et al. (2019) suggested that any ideas and creation of the technology of the special effects must have unique distinctions both in terms of impact,

design ideas, techniques, usage concepts, material usage, size and physical build, specification and functionality as well as their ability to contribute to the amazement of the stage.

### **Literature Reviews**

A theatrical presentation of a musical theatre is indeed an integral division of the wider terms of reference involving technical areas. Technical areas created role is to produce a method of solutions to design ideas as well as provide uniqueness or spectacles in the show. The functionality and the nature of scenic elements as representation are to produce spectacle (Eni & Osuya, 2013). Uniqueness and spectacles in the show would be part of the compulsory area to the musical theatre. Aristotle (1974) also stated that "the spectacle has, indeed, an emotional attraction of its own, but, of all the parts, it is the least artistic, and connected with the art of poetry. For the power of tragedy, we may be sure, is felt even apart from representation and actors. Besides, the production of spectacular effects depends more on the art of the stage machinist than on that of the poet" (p. 37).

Knowledge of the theory alone does not provide guarantees in an attempt to gain an idea during the production process. However, it requires a certain and aspects skill strongly. Eni and Osuya (2013) stated that "...the theatre is a place to behold spectacles. Spectacle implies a lavish performance that involves seeing and hearing. These are fundamental to the scenographic process as they are intrinsic to the dramatisation process" (p. 363). As part of the dramatising process, the overall strength of staging theatre lies on the acting factor, the strong dialogue and the effectiveness of visual arrangement (Baharuddin, 2007). In the implementation to provide spectacles effectiveness through the technical production process of musical theatre in the early stages, all aspects need to be focused, such as text or script, the initial idea of director or designer (Baharuddin, 2007; Mujir, 2005), location and stage facilities (Eni & Osuya, 2013), as well as the technical design concept of special effects.

The issue of theatre design has been discussed for decades to understand what contributes to the process and how to operate it. In relation to this process, theoretically, the main strategies and quintessence have been constructed in set designing processes that include description (brief); research and investigation; formation and development of ideas; exploration; synthesis and manufacturing; and evaluation (Hashim, 2011). In further discussion, Mujir (2005) states the importance of design requires a strategy in the implementation of the design process. The strategy is important as a guarantee of presentation and confidence to the organisations that work together. In this stage, the requirement(s) of the design process would be defined and determined. Also included at the design process stage are the budget and cost that have been allocated for the set designing and how such financial element must be

managed. The financial aspect of set designing is highly crucial, as an admirable design is never possible if the budget and cost have not been adhered to (Hashim, 2011).

### **Problem Statement**

Although, the production design aspects have been mentioned in technical designing, exposing of some other support elements that influences or results to the creation of technical special effects which means in musical theatre performances such as materials, methods of implementation, energy resources will also need to be analysed. According to Tawel (personal interview, 2015) mentioned that expertise or technical field skills theatre arts are still not at a level comparable to foreign countries. For instance, Hong Kong and Western countries developed far more excellent in order to produce experts in the field of technical theatre and stage technology. Eni and Osuya (2013) also believe that auditorium and a technological stage becomes the ideal that designers strive to reinforce. The statements have proven that indeed there is an issue in terms of the technical aspects of the production of a special technical presentation which should be contained and observed to provide awareness guidelines of the importance of research on this technical solution. Furthermore, this research carried out to assist in resolving some of the issues that have been mentioned mostly relate to the requirement and application in assisting the designers, technical directors, even theatre directors towards the technical designing process of special effects.

### **Research Methodology**

In addition to proposing the process in designing the TDSE, there are a few approaches that apply to reflect the key components of research design (i.e. objectives, research questions). As a strategy of data collection and data dissemination, the qualitative research – a case study approach was used to analyse the production of *Aladdin the Musical (2007)*, *Puteri Gunung Ledang the Musical (2006)* and *Cats the Musical (2002)* for which all three products is a virtual using the same stage of *Panggung Sari, Istana Budaya*, Kuala Lumpur, Malaysia. The three case studies were reviewed through an interpretation of data information in more descriptive in nature. Gair and Luyn (2017) argue that the objective of qualitative research is to gather the end-user impact and practical outcomes. Vital to responding to the argumentation, gathering sources and processes undertaken consist of several methods such as direct observation, interviews and also document review, as shown in Table 1.

**Table 1:** Source of Collective Data Acquisition (Source: Authors, 2018)

| Production/Organisation                                                               | Expertise / Practitioner                                                                                                                                                                                                             | Type of Evidence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aladdin the Musical (2007)                                                            | <ul style="list-style-type: none"> <li>◦ Director and Writer</li> <li>◦ Artistic Director</li> <li>◦ Set and Props Designer/<br/>Production Designer</li> <li>◦ Technical Director</li> <li>◦ Stage Crew</li> </ul>                  | <ul style="list-style-type: none"> <li>◦ Idea and concept of the performance (<b>Discussion with Director and Designer</b>)</li> <li>◦ Technique applies. (<b>Technical Design and Drawing</b>)</li> <li>◦ Special effects details. (<b>Production File</b>)</li> <li>◦ Design references. (<b>Designer and Artistic Director - Model and Drawing</b>)</li> <li>◦ Stage control systems. (<b>T.D Notes</b>)</li> <li>◦ Stage facilities details. (<b>T.D Notes</b>)</li> <li>◦ Procedures of technical operation. (<b>Prompt Book and Stage Manual Book</b>)</li> </ul> |
| <i>Puteri Gunung Ledang</i> the Musical [The Princess of Mount <i>Ledang</i> ] (2006) | <ul style="list-style-type: none"> <li>◦ Director and Writer</li> <li>◦ Artistic Director</li> <li>◦ Set and Props Designer/<br/>Production Designer</li> <li>◦ Stage Manager</li> <li>◦ Set Movers</li> <li>◦ Stage Crew</li> </ul> | <ul style="list-style-type: none"> <li>◦ Idea and concept of the performance. (<b>Discussion with Director and Designer</b>)</li> <li>◦ Technique applies. (<b>Technical Design &amp; Drawing</b>)</li> <li>◦ Special effects details. (<b>Production File</b>)</li> <li>◦ Design references. (<b>Designer and Artistic Director - Model and Drawing</b>)</li> <li>◦ Stage facilities details. (<b>T.D Notes</b>)</li> <li>◦ Procedures of technical operation. (<b>Prompt Book and Stage Manual Book</b>)</li> </ul>                                                   |
| Cats the Musical (2002)                                                               | <ul style="list-style-type: none"> <li>◦ Writer</li> <li>◦ Technical Crew</li> <li>◦ Stage Crew</li> </ul>                                                                                                                           | <ul style="list-style-type: none"> <li>◦ Design technique. (<b>Technical Design &amp; Drawing</b>)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                                                                            |                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                            |                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>◦ Special effects details. <b>(Stage Crew Notes)</b></li> <li>◦ Stage control systems. <b>(T.D Notes)</b></li> <li>◦ Stage facilities details. <b>(T.D Notes)</b></li> <li>◦ Procedures of technical operation. <b>(Stage Manual Book)</b></li> </ul>                                                                                                                                                               |
| <p><i>Istana Budaya</i><br/>[Palace of Culture – The National Theatre]</p> | <ul style="list-style-type: none"> <li>◦ Technical Director</li> <li>◦ Civil Engineer</li> <li>◦ Assistant Engineer of Maintenance and Control Stage System</li> <li>◦ Production Designer</li> <li>◦ Lighting Designer/Lighting Technician</li> </ul> | <ul style="list-style-type: none"> <li>◦ Design technique. <b>(T.D, C.E, P.D and Technician Notes)</b></li> <li>◦ Special effects details. <b>(T.D, C.E, P.D and Technician Notes)</b></li> <li>◦ Stage control systems. <b>(Stage Manual Book)</b></li> <li>◦ Stage facilities details. <b>(T.D, C.E, P.D, L.D, A.E &amp; Technician Notes and Stage Manual Book)</b></li> <li>◦ Procedures of technical operation. <b>(Stage Manual Book)</b></li> </ul> |

**Notes:** T.D=Technical Director; C.E=Civil Engineer; P.D=Production Designer; L.D=Lighting Designer; A.E=Assistant Engineer

### ***Participant-Observation***

Direct observations were used to monitor, engage and participate during the productions within the technical preparation process. The process was observed among all three productions and practitioners, to document and examine, the researchers' understanding of the real environment in terms of the materials, process and application in finding the gaps between the practice, verbal and documentation. The production took place at *Panggung Sari, Istana Budaya*, Kuala Lumpur, Malaysia.

### ***Interviews***

Interview with experts in the different areas such as performance and artistic direction, production design and scenography, stage management and also the technical department of



*Istana Budaya*. Each of the expertise was selected because of the potential of related data contribution or relevant input and close to the scope of the review of the technical design creation process of special effects in the production of musical theatre. All interview questions were generated and analysed based on the technical design process to find strengths and weaknesses to clarify the potential needs and give solutions to the current process, technique, application and materials used.

### ***Document Reviews***

The process of data collection was assisted with the third approaches, which were document reviews, such as stage management prompt book, production management file, sketches, and technical drawing. All production files and record details have been contributing to the details needed, especially related information during the pre-production and the production process. The records personally kept especially for current and future reference the artistic documents such as technical drawing, the design idea of art, illustration drawing, model box (replicas of set design), plan of *Panggung Sari Istana Budaya*, list of stage automation and facilities, script, draft drawing, references of design, expenditure and also production program books. Production files and stage manager prompt book also contribute to information as a reference about the TDSE that had been made at earlier production during the rehearsal completely. All documents were organised and incorporated by individual production to examine the technical design process and sufficient or potential materials and its relation to implementation and application during rehearsal and performances.

### **Result of Analysis**

This result of section determines four elements of source of idea development, the technique of implementation, technical tool implementation and technical material application design in TDSE in three musical theatre performances *Aladdin the Musical (2007)*, *Puteri Gunung Ledang the Musical (2006)* and *Cats the Musical (2002)*. The interrelation between special effects spectacles and the effectiveness of technical designing of these four elements, as shown in Table 2, consists of ten (10) TDSE.

**Table 2:** Summary of TDSE Spectacle Application and Implementation (Source: Authors, 2018)

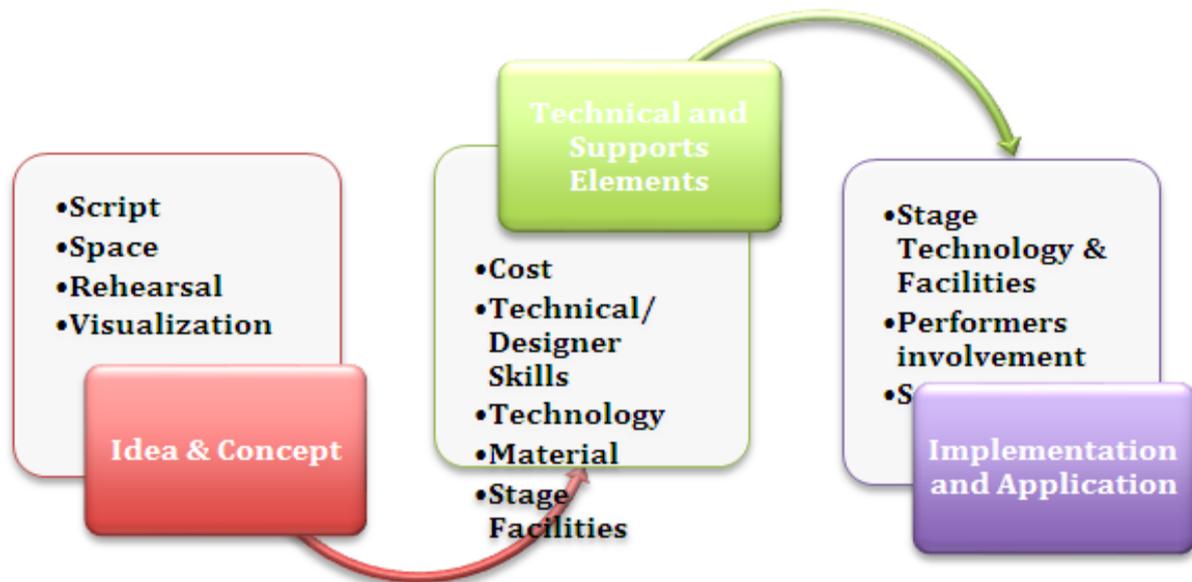
| Production/<br>Performance                                                                                   | Tdse                                             | Source<br>of<br>Design<br>Ideas                 | Technique of<br>Implementation                                                             | Technical<br>Tool<br>Implementation | Technical Material<br>Application                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aladdin<br>the Musical<br>(2007)                                                                             | Genie and<br>the Magic<br>Lamp                   | Text and<br>Designer                            | 3-dimensional<br>and 2-<br>dimensional<br>image display,<br>diverse<br>background<br>mood. | Holographic/<br>Screening           | Frame size (size<br>determined by a<br>designer), film (Surface<br>image display), Steel<br>cable (flying bar frame),<br>LCD projector, video file,<br>electrical source.                         |
|                                                                                                              | Flying<br>Mat                                    | Text and<br>Designer                            | Slides                                                                                     | Railings/ Roller<br>Coaster         | Platform (mat), Runway<br>structure (steel), wheel /<br>caster, plywood as a<br>backdrop.                                                                                                         |
|                                                                                                              | Wizard's<br>Cave                                 | Director<br>and<br>Designer                     | The collapsing<br>gates, ruins of<br>buildings                                             | Hanging<br>Structure                | The structure of the set<br>(according to designer's<br>ideas and functions), has<br>separate parts, hinges,<br>steel cables, weights,<br>holders, stoppers,<br>mounting keys.                    |
|                                                                                                              | Wizard's<br>Crescent<br>Moon                     | Text and<br>Designer                            | Rotation of<br>object                                                                      | Chain System                        | Small teeth bearings,<br>sprockets, paddle<br>(pedestrian), mechanical<br>frame structure set<br>(according to designer's<br>ideas and functions),<br>holders and handle,<br>stopper and locking. |
| <i>Puteri<br/>Gunung<br/>Ledang</i> the<br>Musical<br>[The Princess<br>of Mount<br><i>Ledang</i> ]<br>(2006) | Gunung<br>Ledang<br>(Mount of<br><i>Ledang</i> ) | Text,<br>Designer<br>and<br>Stage<br>Facilities | The mobility set<br>creates a large<br>set, mountain<br>transformation                     | Wheel Structure-<br>Push/Pull       | Set structure (according<br>to designer's ideas and<br>functions), wheel/caster.<br>set base frame (iron).                                                                                        |
|                                                                                                              | <i>Gunung<br/>Ledang</i><br>Waterfall            | Text,<br>Designer<br>and<br>Stage<br>Facilities | Waves                                                                                      | Fabric Overflow                     | Lightweight and thin<br>fabrics, size-filled and<br>over-the-shelf.                                                                                                                               |
|                                                                                                              | Java Seas                                        | Text,<br>Designer<br>and<br>Stage<br>Facilities | Soft and wavy<br>surfaces                                                                  | Fabric Spread                       | Lightweight and thin<br>fabrics, size-filled and<br>over-the-shelf.                                                                                                                               |

|                         |                                           |                                               |                                                                       |                      |                                                                                                                                                                                          |
|-------------------------|-------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | Java Pinisi Ship                          | Text, Director, Designer and Stage Facilities | Large object movements                                                | Manpower – Pull/Push | The structure of the built-in pin assembly (according to design and function ideas), modified parts of the body (punched floor, furniture and engine removed), only have a drive system. |
| Cats the Musical (2002) | Magical Transformation of Mr. Mistoffeles | Text, Director, Designer, Stage Facilities    | Dropping off or hanging. Gimmicks appearances                         | Harness              | Harness systems, cable and safety cables, hanger clips, ballast, stopper, pulley, power source, monitor console, switch panel, tracked harness machine.                                  |
|                         | Magical Floating Tyres                    | Text, Director, Designer and Stage Facilities | Elevator Lift System (up and down), gimmicky appearance of the artist | Hydraulic Cylinder   | Cylinder hydraulic system, electronic console, power source, portable under head space, trapped door system, platform (tyres).                                                           |

## Discussion

The theatre production process has three main phases known as pre-production (preparation), production (during the performance) and post-production (after the performance). The TDSE is also no exception in all the preparatory phases. As illustrated in Figure 1, a special way of creating technical design techniques is an important process involving a technical ideological angle of thinking about the layout of the mechanisms and the construction techniques of creation.

**Figure 1.** The Technical Design of Production Processes of Special Effects



The manufacturing process involves the construction phase of a special set of technical effects by guiding the original graphic plan produced by the designers at an early stage. Analysis of methods of manufacturing special technical designs is reviewed on all technical specialties list of special effects for viewing and identifying techniques and approaches to a particular technical effect produced in all production. However, there are some technical designs and special effects produced with the help of existing stage facilities on the stage. The existence of special effects actually exhibits creativity, ideas and uniqueness in every staging and certain stages. All special effects implement and apply in different mechanical and technical systems, requirements and its support elements.

### *Aladdin the Musical (2007)*

In the theatre production of *Aladdin the Musical*, the use of technical design system of special effects has its advantages especially in providing the abnormality, uniqueness and identity of the production with RM 80,000 of the total cost.

In the design of Genie and magic lamp, the use of special holographic effects techniques (RM60,000 in total cost) is especially helpful in publishing the Genie subjects that are able to change shape. Holographic methods have the advantage of displaying magical visuals that are fast, moving, subjects look in a three-dimensional and fly-shaped realistic image with an impressive visual effect. However, the application of holographic technical designs has another drawback. The images displayed on the surface of the film have difficulty being watched by the audience standing on the edge of the stage [the sightlines]. Existing images are only more obviously watched by centre audiences. Electronic gadgets such as LCD

projectors, laptops and video players have the potential for issues of outsourced, self-erased images and technical problems. The flying bar system involves the mechanism of the motor in its operation. However, the implementation of the holographic design is highly dependent on the over mechanical stage facility to raise or lower the frame to the surface of the stage. The creation of TDES of flying mats (RM10,000 in total cost) also provides realistic features of the action. The flying mats helped the actors appreciate the situation that they were riding a mat and flying into the air, by using the non-automated operational mechanical system [human capabilities-push/pull] of the runway. The creation of the runway system physically requires a large space on stage especially on the left and right wing of the stage, storage space, stage space and also the size of the transport used to move the set to stage from the workshop. Its large, non-separable physical factor creates many difficulties while requiring a lot of manpower or crew to reject it. Physical factors are the cause of problems in the use of mechanically structural runways but from the point of view of the other such builders are, in fact, intentional. The built-in railway structure has its own reasons and reasons, especially in providing assurance of soundness and safety in its use.

The combination of LCD display technology as a background with the technical base of the track provides an impressive visual effect. LCD display methods are among the most effective innovations and interactive performances in musical theatre form. However, the combined application of the two elements should undergo a thorough examination, especially in parts involving the use of electronic materials and computers. Electronic gadgets have their own risk of being heat resistant and can be damaged at any time. Therefore, technical management needs to provide additional tools that can help replace the main tools in the event of a problem on the day of the show.

The TDSE of the Wizard Cave is used by the suspension structure system (RM5000 cost of expenditure) by producing the special visual effects of the gate robots. The applied system is an easy-to-use, user-friendly safety operation with a lock and release system. The mechanical suspension structure is one of the techniques that provide a visual appearance of large and clearly visible robust movements. Physically, sets that involve the suspension structure system require a large and strong building. Indirectly its building structure involves the use of materials such as iron and also wood which takes some time to complete. The large set of buildings requires a large space well on stage, storage on both sides of the wing, storage space and transport. Physically, a high and heavy set of builds requires a large, wide bottom of the site to support and provide stability to any of the larger builds. However, problems and weaknesses in terms of space requirements can still be addressed if the location of the show has a large and spacious space such as at *Panggung Sari, Istana Budaya*. The manual operating system applied to the hangar structure requires human power. The user who controls the technique should have the power to change the load. The technical handling of gate robbery cannot be done by the children and is extremely risky. The technical suspension

system is created to move two separate parts to collapse down. However, the technical design of the gate has a very limited movement. The collapsing area really depends on creativity and design ideas. The gate transformation can be done in many quantities if the built-in set is large and varied, each of which is also provided by the suspension structure system. Still, the process of realising its diversity is also influenced by the allocation of costs.

The development of the mechanical system on the set of Wizard's crescent moon (costing of RM2500) using manual chain technical systems are applied to the special effects of crescent only using human capabilities. The use of a manual mechanical chain system has a particular privilege. First of all, it will be able to slowly and silently change the crescent position. Chain-systems provide flexible features with easy operational features, in a slow or a speedy or silently mode accompanied by songs. The use of a chain system requires the crew or actor's push to enter the stage. The physical set of crescents was built with a small size and was unable to carry excess weight. Set size errors are not very apparent and can still be used to bring two to three actors. Among the other disadvantages detected against mechanical chains is its ability to change the set position of the crescent only within a limited range. The object change can only be done within 90 degrees. The size or distance of the change depends on the length of the chain and the size of the sprockets as well as the hub. It means the size of the change can still be determined by the size of the mechanism used. The mechanical use of the chain needs research and control because of the risk of being stuck that can affect the moving movement.

### ***Puteri Gunung Ledang the Musical (2006)***

In the theatre production of *Puteri Gunung Ledang the Musical*, there are four TDSE to exhibit a dramatic atmosphere consists of *Gunung Ledang* (Mount of *Ledang*), Java Sea, Java Pinisi Ship and *Gunung Ledang* Waterfall. Nevertheless, two of the technical designs that existed were the stupa as a basic set of backgrounds to translate the special effects in the variation of Mount *Ledang* and the *Gunung Ledang* waterfall (RM120,000). While two technical designs each use different technical designs such as banners as well as shipbuilding mechanisms. All movement, implementation and change of set position and technical special effects are done by using human capabilities, especially for *Gunung Ledang* set, Majapahit palace and also Melaka jetty. The way technical operations traditionally provide distinctive advantages besides displaying visual desires by directors and scriptwriters. In realising most of the place settings, many designers use stupa cantaloupe techniques that can be separated into six main sections.

In the TDSE mechanisms for *Gunung Ledang*, the technical application of wheeled structures with push forces has shown the movement of sets of fluctuations in line with the duration of the song being played. The adjustment of such technical design indirectly helps bring every

spectator wandering and following the exchange moments of *Gunung Ledang* as it is only suitable for use in large stage space. Generally, a set of mechanically-applied and structured mechanics gives freedom to any change, change and designer's wishes, and contributes to the crew's ability to make changes to the stupas-stupa by moment (an action moment) and music in a more dramatic state. Hence, from the expenditure perspective, the application of the wheelset technical system provides many benefits and savings in terms of cost reduction by using inexpensive materials and technical controls. Nevertheless, manual mechanical technical selection demands other parts to support and assist in raising musical elements. Musical elements that are intended include acting or dance, lighting, props, audio and sound and costumes and make-ups, sometimes need to be involved in the exchange of sets. Real-life collaboration also provides the beauty of set usage and enhancing creativity in the exchange of scenes, directing and acting.

The TDSE aspect of the Java pyramid sail in staging is one of the special effects that are interesting and able to create dramatic elements. Looking at the aspects of technical designs applied to the pinion vessels, the movement of the vessels is generated through the capabilities of manpower. A physically crafted sailboat is actually a combined result of the two basic parts of the ship prop construction that are fitted to a modified car frame (car skeleton). The frame of the car has undergone some modifications such as cuts across the floor to allow crews or actors to run down and drive. The purpose is to reduce excess weight and provides a solution to the guided sailboat drive, including the cost savings, space and time, also expected lower maintenance. Technical design demands are equipped with double chain mechanical devices (two-chain threads attached to two parts) aimed at providing different dynamics of movement. The double chain mechanical equipment makes the yacht position run in both directions (front and rear) and can be shaken from top to bottom. However, with its heavy weight, its operation also requires greater mobility of manpower for the driving system.

The next TDSE is the Java Aquatic Sea which is produced by fabric discharge. The adoption of fabric design technical dislocation contributes to some of the benefits of its implementation, such as allowing creative touches to replace the water medium. The cost of the allocation is a more economical and user-friendly technique, operated by the actors with a minimal mechanical tool, the flying bar. However, the airwaves are produced on a roll of fabric repeatedly to look natural. The impact of wave production becomes more attractive if it receives air supply from a special electrical device. The use of specific tools can prevent large workforce engagement because of the large size and length of fabric widths. The method of consumer design disruption of a technical fabric is still relevant for production, which has a limited allocation cost and achieves the result of an impressive water wave effect.

The TDSE subsequently involves *Gunung Ledang* Waterfall. The selection of the implementation method uses fabrics overflow techniques from certain parts to the bottom of

the stage. Fabric overflow techniques provide savings in terms of time and cost of provision. The results are also interesting and able to give a more creative image impression. The fabric surface is assisted by technical lighting in providing stripe and blue contrast colours representing the waterfalls. The cloth overflow is handled by several actors manually. Fabric overflow technical designs have their own disadvantages, among them the duration of execution of overflowing fabric at risk. A special effect of a waterfall can be produced over a different period of time as it is practised by human forces. Fabric overflow conditions and processes also reveal the actors who handle it while the overflow of fabrics can be made using a combination of more appropriate mechanical methods. The technical design of the overflow of fabrics is still one of the alternative methods for production, which has limited allocation costs.

### ***Cats the Musical (2002)***

In examining the impact on two TDSE found in the *Cats the Musical*; the technique of application is one of the most suitable methods because the operation can be done manually and repeatedly. The technical harness is equipped with safety tools such as safety chain. Looking at functionalities and technical ability harness, its ability to decline and raise an individual in addition to being two-way either move down or up. The cost of providing technical equipment harness is relatively cheap. In addition to its user-friendly and easy-operate features, its operation can also be implemented manually. Consumption of harness system also has its own risk as its capability can only carry one person for one tool. Its handling using human resources is also a source of difficulty because it involves three human beings if it is manually realised. Technical usability harness needs to be implemented from the top of the stage and requires monitoring or supervision of experts to ensure that all techniques are done correctly and accurately as well as preventing injuries and accidents.

Meanwhile, the TDSE of magical floating tires is one of the most appropriate mechanical techniques in lifting and removing actors. The technical hydraulic cylinder is easy to understand and user-friendly. Other factors provide advantages to hydraulic technical systems such as having safety features. The mechanical parts produced have undergone certain test phases in the early stages before being allowed for installation. Technical hydraulic cylinder has an ability to lift several people by guiding the allowed load capacity. Its handling can be done automatically because it is equipped with electrical and computer. The hydraulic system is more suitable for long periods of theatre performance because the cost of use is very high. The hydraulic system can be used with a certain limit as it is equipped with electrical systems, electronics and computers that can be generated automatically. The use of the hydraulic technical design system becomes more appropriate as it is able to reveal an impressive special effect and coincide with the objective of John Napier (the designer).

However, hydraulic technical systems also have risks such as those of other systems which have a very large and very heavy physical size. It involves special transportation

arrangements for any transfer or change of location. In addition to these issues, hydraulic systems require certain installation periods due to complex and sensitive mechanical content. The care process requires periodic maintenance schedules so that all of its tools are always functioning properly. Even the use of hydraulic systems also invites high-cost production. Designers or production parties need to create additional stage surfaces at the top of the original floor to hide the mechanical properties of the viewer's vision. Its handling is very detailed where the hydraulic technical tool needs to be tested all the time to ensure the condition of the equipment is always in good condition and free from leakage, short circuit, damaged or burning system. As such, the deal affects only the relevant experts.

### **Conclusion**

This research had analysed the processing of TDSE and discussed the features and uniqueness of the special effects in the chosen musical theatres. After examining all the technical features of the special effects, the average all have graphic sketches and careful planning in the initial stock of production inventories. Each of them shows that excellent designers like Fairuz Ariffin - *Aladdin the Musical* (2007), Raja Malek - *Puteri Gunung Ledang the Musical* (2006), and John Napier - *Cats the Musical* (2002), emphasise the technical designs that are to be implemented safely, perfectly, precisely with the situation, done with harmony and harmlessness.

Steps during the process of creation of accessible design technical special effects consist of finding a reference or sample, sketch illustrations, drawings, application of appropriate technical methods, mechanical adjustments, tests the initial building inventory technical special effects up to the final construction. The paper has shown that a design process is a very important part towards producing the effectiveness of technical special effects which did not only providing comfort to the audience or the production party alone. Instead, it demands the creation of a technical inventory that seeks to uniqueness, originality, and innovation that are different from other musical theatre products through technical special effects. Additionally, musical theatre needs a lot of surprises or amazement elements along with the performance.

### **Acknowledgement**

The authors acknowledge the support of the Ministry of Higher Education Malaysia in providing SLAB/SLAI Scholarship (UiTM). We would like to thank the Universiti Teknologi MARA and the Universiti Putra Malaysia for the research opportunity. A special tribute to all organisations, productions, directors, designers and individuals who contributed to this research.

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