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THE NATIONAL CARNIVAL COMMISSION
OF TRINIDAD AND TOBAGO

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VANUS INVESTMENTS LIMITED

ANNEX IV (B)

THE STEELPAN MANUFACTURING INDUSTRY

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1. INTRODUCTION

Vanus Investments Ltd has been commissioned by the NCC to prepare an Aide Memoire which will define the nature and scope of the Carnival Industries, identify key stakeholders and among other things will allow for determination of strategies, policies and implementation programs for the development of these industries and by extension, the Carnival event. Michael Cooper has been engaged by Vanus as the Consulting Engineer, Pan Manufacture with responsibility for:

- I. Developing a description of the technical production function of pan
- II. Developing a related technical report on the production function of pan
- III. Providing inputs into the design of policy and strategy for an awareness program

1.1. SCOPE OF WORKS

- I. Provide support to Dr. Vanus James in the technical characterization of the production function of steelpan manufacture
- II. Prepare a technical report that characterizes the following:
 - A. The activities and outputs of steelpan manufacture
 - B. The inputs into steelpan manufacture, including materials, capital inputs, labour and skills
- III. Indicate the origins of inputs used, in particular
 - A. Whether domestic or imports
 - B. Whether invented in the production process or otherwise
- IV. Identify the important loci of actual and potential innovation in the manufacture of pan, whether historical, current or future
- V. Indicate the necessary primary focus of innovations, taking into account current and anticipated trends in related technologies and markets
- VI. Collaborate with the Lead Consultant and others in the preparation of the Aide Memoire
- VII. Collaborate with the Lead Consultant and others in the development of awareness-building programs

1.2. KEY RESPONSIBILITIES AND DELIVERABLES

- I. A description of the technical production function of pan
- II. A related technical report on the production function of pan
- III. Inputs into the design of policy and a strategy for an Awareness Program



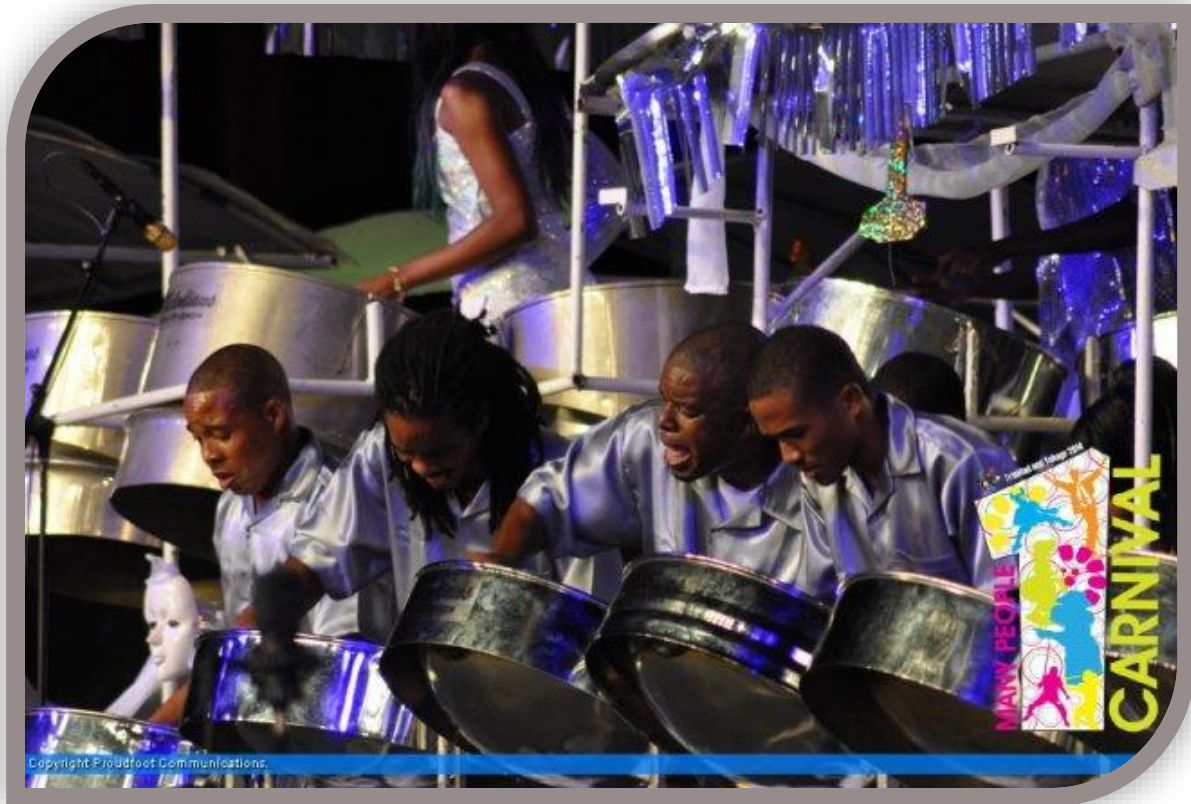
1.3. PERSPECTIVE OF THE STEELPAN MANUFACTURING INDUSTRY

1.3.1. THE INSTRUMENT VS THE MUSIC

The Steelpan Industry can be separated broadly into two components:

- I. The Music – most visible to the general population and includes performance/entertainment and all related activities, recording and music production, event production and management, teaching and instruction services, music composition and arranging, publications and support services, panyard activities and services
- II. The Instrument – relatively unknown arena which includes production of instruments and accessories, all related manufacturing activities, service of instruments and accessories, supply/sales related activities and training

This report will be concerned with The Instrument.



2. THE STEELPAN MANUFACTURING INDUSTRY

The Steelpan Manufacturing Industry falls within the subject area of the Instrument which includes:

- I. PRODUCTS
 - A. Steelpans – Various types and sizes
 - B. Stands and racks
 - C. Sticks
 - D. Cases
 - E. Percussion-including Iron, scratcher etc
 - F. Instruction materials, literature, aides
 - E. Tooling and Machinery
 - F. Systems
 - G. Skills
 - H. Packaging activity and materials
 - I. Capacity development
- II. SERVICES
 - A. Panmaking (excluding tuning)
 - B. Tuning/ blending
 - C. Refurbishing/ maintenance
 - D. Coating
 - E. Fabrication
 - F. Transport
 - G. Training/ skill development
 - H. Customer Support/Advisory
- I. INNOVATION & TECHNOLOGY
 - A. Standards and Specifications
 - B. Applied Technology
 - C. R&D
 - D. Innovation/Invention
 - E. Intellectual property
 - F. Product Development
- I. PRODUCTION
 - A. Entities
 - B. Facilities
 - C. Equipment
 - D. Sourcing of materials
- I. MARKETS
 - A. Segments/ products
 - B. Market Intelligence
 - C. Market Analysis
 - D. Market Development
 - E. Demand – Actual vs Potential
 - F. Promotional Strategies
 - G. Product Sales
 - H. Support services

All of the above impact on the Steelpan Manufacturing Industry.



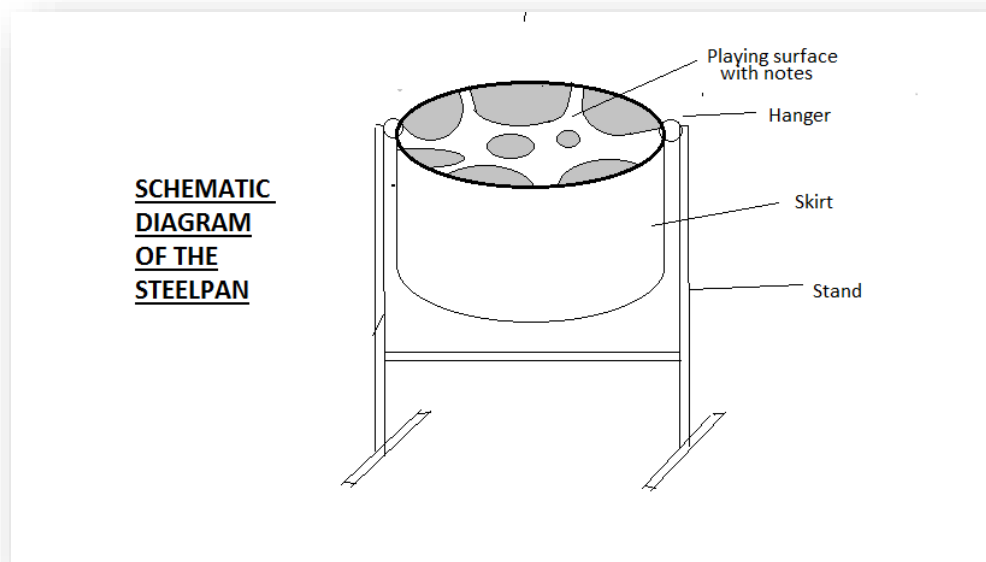
3. THE STEELPAN INSTRUMENT

For the purpose of this report, the Steelpan will be broadly physically described as follows:

- I. An open ended steel drum consisting of
 - A. A circular concave playing surface which is occupied by hand-worked elliptical convex profiles of varying dimensions called notes.
 - B. A cylindrical skirt that is mechanically attached at one end to the playing surface by seaming or welding. The circular ridge of this attachment is called the rim.
 - C. Holes on the rim or the skirt from which the drum is suspended by hangers for playing. Some drums are supported on an insulated stand so suspension is not necessary.
 - D. Hanger made of insulated rope or wire which is used for suspending the drum on its stand.
 - E. The notes on the playing surface are sized and arranged for the best reproduction of tone, timbre and pitch. Each note is tuned to specifications.
- II. A stand which allows the drum to be suspended or otherwise supported where its vibrations will not be restricted. The stand may be made of any material and specification as long as it avoids contact with the drum except thru the hanger or support.
- III. Playing sticks or mallets which are used by the player to strike the notes for production of sound. The stick consists of a straight shaft of circular profile of which the extremity is covered with rubber or other material with similar properties.

The following is a schematic drawing of the steelpan:

FIGURE 3. 1



The Steelband is a combination of Steelpan Instruments with Percussion Instruments added. There are a variety of types of steelpan instruments in a steelband which produce the many voices required for orchestration. The Steelpan Instruments most commonly used in Existing steelbands are:

- I. Tenor (Soprano) Pan
- II. Double Tenor (Double Alto) Pan Set
- III. Double Second Pan Set
- IV. Double Guitar Pan Set
- V. Triple Cello Pan Set
- VI. Four Cello Pan Set
- VII. Quadrophonic Pan Set
- VIII. Tenor Bass Pan Set
- IX. Low Bass Pan set

Other than the Tenor pan, all other instruments (denoted as sets above) consist of combinations of multiple drums of varying note sizes and skirt lengths. Popular Percussion instruments which are manufactured locally are the Iron and Scratcher. There are also steelpans made specifically for use in Education, Gifts and souvenirs, Toys and Music therapy among others. The principles of making and playing these types are the same as described above. There are also Ornamental steelpans which are non-performing which will not be covered in this report. Hybrid versions of steelpans which include the Hang and the Tongue drum which are in the worldwide marketplace will not be considered in this report.

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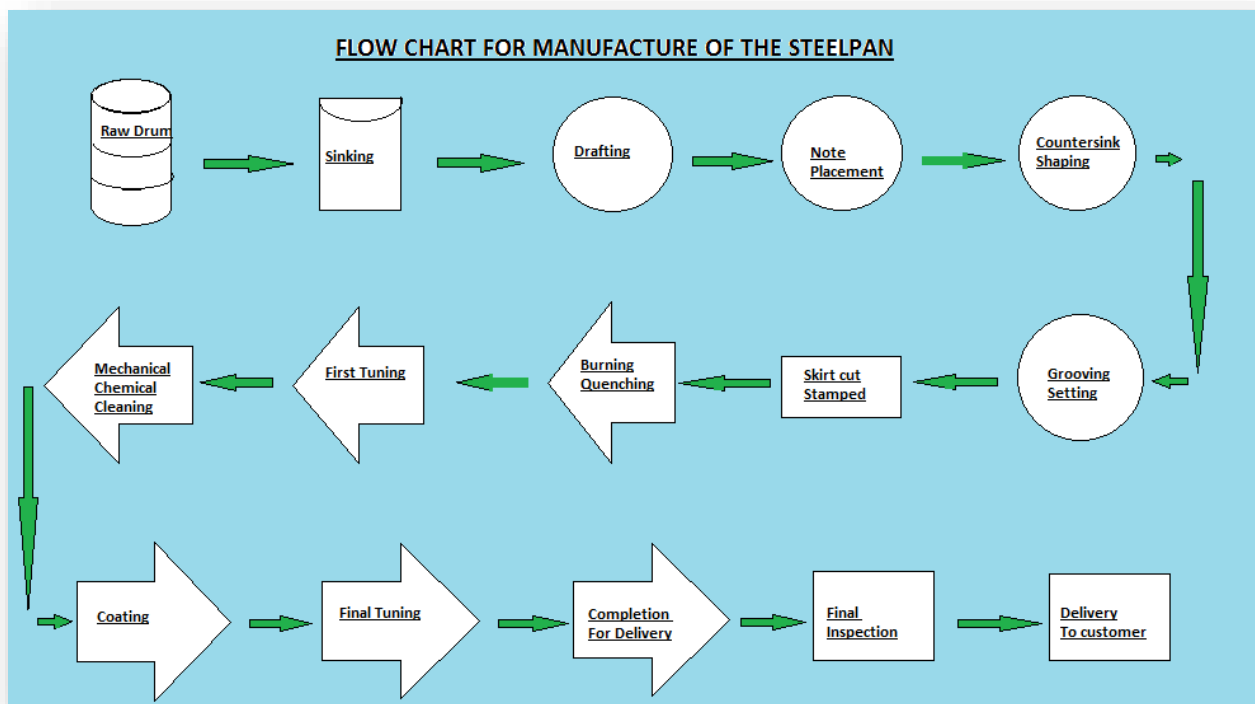
4. PRODUCTION OF THE STEELPAN

The fundamental process of sequential activity for production of a steelpan (for each drum) is as follows:

- I. Drum Making
- II. Pan Preparation – includes
 - A. Sinking of circular playing surface
 - B. Drafting
 - C. Countersinking
 - D. Grooving
 - E. Cutting
 - F. Stamping (ID)
- III. Burning
- IV. First Tuning
- V. Coating
- VI. Final Tuning
- VII. Completion for delivery – includes
 - A. Scribing
 - B. Labelling
 - C. Packaging with Accessories

The fundamental process for manufacturing sticks and stands will not be included in this report. The following Chart shows the sequential stages of manufacture of a steelpan.

FIGURE 4. 1



5. PARTICULARS OF PAN PRODUCTION ACTIVITY

5.1. DRUM MAKING & SUPPLY

Most panmakers currently purchase assembled drums and are not involved in the drum making activity. However an integrated manufacturing operation will include drum making operations beginning with sheet metal as the raw material.

Drums for making pans may be open-ended (pan blanks) or close ended (now most popular as two pans of most types can be made from a single drum).

Materials

Steel sheeting of specified gauge and chemical composition. The AISI Specification range must be met as the steel composition is critical to vibration for the purpose intended.

Equipment

Drum making machinery including roller, seam welder, guillotine, circular cutter, forming press, and a crimping machine for attaching pressed circular disc to the cylindrical kidney. In some cases direct welding is applied (e.g. G Pan)

Process

- I. Sheet metal is cut in Rectangular profile and rolled to form a cylinder which is secured by seam welding of mating edges.
- II. The cylinder is flared at both ends.
- III. The cylinder is placed over a rolling machine which produces re-enforcement ribs on the main body.
- IV. Sheet metal is cut into circular disc.
- V. Disc is pressed to create edges with profiles for mating with flared edges of cylinder.
- VI. Disc and cylinder are connected by rolling edges into a tight rim on both ends of the cylinder.

Operation

Modern equipment for drum making is standard and the level of automation is determined by the desired output. For levels applicable to local industry semi-automatic equipment is adequate which requires operator inputs from a control panel after placing materials in set positions on the equipment.

Semi-skilled labour can be trained and adapted to this operations.

5.2. PAN PREPARATION

While this is not the highest skill level in the process, it is critical to good results of final product as shape, note sizes and profiles, and hammering techniques determine quality and stability of the produced sound and aesthetic quality of the finished product.

Sinking

Equipment - Heavy Hammer. (Heavy ball has been used in the past). Currently panmakers are gravitating to the use of pneumatic hammers which reduce operator fatigue and increase speed of sinking

Process

- I. The circular area is mapped out with concentric circles.
- II. Hammering of sheet metal is done beginning with the outer circles and moving to smaller circles with single passes. This action is repeated until gradually the bowl shape is achieved. The operator periodically checks the profile of the bowl as it goes down as he seeks to achieve a profile with specific measurements at each point.
- III. A lighter hammer is used for the final stage of sinking to produce a bowl surface with minimal visible indentations.

Drafting

The bowl surface is mapped out using designated tools, techniques, templates and measurements to establish the placement and dimensions of notes. The outline of notes are drawn on the surface of the bowl.

Countersinking

Further hammering is done on and off the notes with the objective of creating a convex profile for each note and tightening the areas between the notes for separation of vibration properties. Proper hammering techniques at this stage will also enhance the smoothness of the finished surface.

Grooving

A punch is used to create continuous indentations which define the border of the note. It is felt that this also acts as a barrier that assists in note vibration separation but some panmakers produce without grooves with good results. The countersinking process and note placement are therefore very critical to this property of separation. The groove is further hammered to complete the shaping and finishing operation of the preparation phase.

Cutting

The skirt is cut to specified length based on the instrument being produced. Holes for hanging are drilled on the rim or the skirt as applicable.

Stamping

At this stage the pan may be marked for Identification. Some panmakers have implemented a numbering system which allows pans to be tracked through the production system to the end users. Labour skill level required for these operations may be semiskilled but must be trained in use of tools and templates and details of each activity. Techniques will be mastered with supervised use and practice in production over time.

5.3. BURNING

Equipment

Torch/flamethrower, Ring burner or oven (some panmakers still use fires from wood or other materials).

Process

Playing surface primarily is fired directly with flame from the burner for specified time. Operators generally use the changing colour of the steel and time of change to determine quality of burn. Feedback from the tuners also guide this process. Adjustments are often required when new materials (new drums supply) are used. The pan is quenched with water immediately after burning. Some tuners prefer cooling by ambient air.

Operation

Many safety concerns involved. Proper gear and facilities necessary. Unskilled Labour can be used.

5.4. FIRST TUNING

This First Tuning is referred to as “breaking in” in some quarters and is the first hand-working of the steel to produce vibration of specific frequencies from the notes.

Equipment

Strobe Tuner, Tuning stand, Tuning hammers and tools.

Process

- I. Setting of pan (this is an exercise in shaping the notes for best response during the tuning activity).
- II. Tuning of all notes individually.
- III. Some tuners prefer to set the pan before it is burnt.
- IV. Pans which have completed this stage are called ‘Raw-tuned’.



Operation

Activities performed with ear guidance in initial stages and confirmed by checking with the stroboscope for final stage. Accuracy of pitch is not critical at this point however the vibration of the notes within specific ranges and with required harmonics is the goal.

Requires intermediate level tuning skill.

5.5. COATING

Coatings have evolved from uncoated (raw) finish, to painted, to chromed and more recently, powdercoated. All coatings are applied at this stage in the production process.

Equipment

Coating activities are generally outsourced to companies which provide such services as panmakers with few exceptions do not have the capability inhouse.

Process

- I. Unwanted dents and imperfections on pans are removed.
- II. Metal is cleaned using chemical and/or mechanical methods.
- III. Base protective coating is applied (corrosion protection).
- IV. Undercoat applied (where applicable).
- V. Top coat applied.

Operation

Performed at the coating shop with skilled labour.

5.6. FINAL TUNING

- I. The coated pan goes back to the tuner for final tuning. Also called Fine tuning.
- II. Special padded hammers are used to avoid damage to the coated surfaces.
- III. Stroboscopes are used to accurately confirm the pitch and partials of each note.
- IV. This activity critically completes the tuning process with accurate pitch and required harmonics for tonal quality.
- V. High Skill level necessary for consistently acceptable quality standards to be achieved. This is the highest level of skill required in the pan making process.

5.7. COMPLETION ACTIVITIES

Scribing

This is where the notes are written or otherwise inserted on the pan for guidance of the player. Generally notes are not scribed on the professional level instruments unless requested. Slotted or dotted lines identifying the note boundaries are also written in as applicable at this stage.

Labelling

Involves branding and insertion of labels for Identification of pan type, numbers and manufacturer information.

Packaging

Underestimated but critical component of the manufacturing process as poor packaging results in poor quality to the customer. Steelpan tuning must be protected in transport, storage and delivery and packaging is fundamental to this. Packaging of accessories when included with the pan must also be carefully designed.



6. INPUTS TO STEELPAN MANUFACTURING

9. INPUTS TO STEELPAN MANUFACTURING		
MATERIALS	APPLICATION	SPECIFICATIONS/COMMENTS
Steel sheets	In all steelpan for making drums or pan blanks	AISI 1015 specification and the gauge will vary from 18 for conventional instruments to 22 for undersized products. Imported material
Drums	Supplied in assembled form to most manufacturers.	Discarded drums have been used over the years and in recent times are still used for the lower range instruments while drums made from spec steel have been favoured for the higher quality standard front line pans. Locally available , also imported semi assembled
Kerosene/cleaning agent	For cleaning metal before and after preparation work	
LPG	Burning activity	
Coatings		
Metal preparation chemicals	Cleaning and base protection of metal	Rust remover, corrosion protection chemical
Sandblasting media	Sandblasting used for rust removal	Medium grit size to produce smooth finish
Sanding paper	For surface preparation using sanding method	Medium grit to avoid marks
Powdercoat powder	In powdercoating operation	Powder properties used depends on protection and performance required. Imported material
Chrome plating	For chromed finishes	Provided by Chrome shops
Paint	For painted finishes	Hard drying
RHS steel	Stand manufacture	Various profiles/ sizes. Every pan must have a stand. Locally available
Welding/fabrication materials	Stand manufacture	
Wooden dowells	For making sticks	Metal tubing also used
Rubber tubing, balls	For stick tips	Various sizes
Masking Tape, glue, ties	Packaging	
Labels	Branding, manufacturer info, ID,	Standard commercial requirements
Although most materials are locally available, many are sourced abroad by local agents		
ESSENTIAL EQUIPMENT/ FACILITIES/TOOLS	APPLICATION	COMMENTS
Preparation Shop		
Sinking stand/pad	Sinking of drums	Several forms based on drum materials
Complete range of hammers	For all preparation activities	Standard or pneumatic
Templates, stencils, gauges	For drafting and accuracy of note dimensions	Varies with pan makers and methods
Workshop - sound contained	Noisy operation	Tuning activity require low noise if in same location, proper ventilation and lighting required
Safety equipment - ear protection	Operator safety	Excessive exposure of operators
Burning		
Torch, Ring burner or Oven	Burning pans	Temperature or vision controls
Burning area		Clear of any fire hazards
Heat protective wear and tools	Operator safety	Heat hazards

Tuning		
Tuning Booths	Tuning activity	Insulated from external sound. Tuners require minimal noise to work
Stroboscopes	For checks of pitch and tone	Visual, manual and audio
Tuning hammers and tools	Tuning activity	Varies with tuners
Seating, ventilation and lighting	Operator comfort	Concentration over extended periods required
Coating		
Cleaning area	For chemical and sanding metal preparation	Prep and base protection for coating
Sander, scrubbers, etc	Use in cleaning activity	Current methods used
Sandblasting booth and equipment	For sandblasting where applicable	used as prep for powdercoating
Paint booth and equipment	For spray painting where applicable	Outsourced by most makers
Powdercoat booth and equipment	For powdercoating where applicable	Outsourced by most makers
Baking oven	For powdercoat operation	
Space for storage and handling	For any coating operation	Quality space required for quality outputs
Chrome plating	chromed products	Outsourced to chrome shops
Racks, fixtures, cleaning equipment	Coating operations	Clean dust free shop required for any coating operation
Workshop		
Fabrication, welding eqpt/tools	Production of stands	Also used to support production with fixtures, tools, maintenance etc
Woodworking tools/eqpt	For heavy shipping packaging, stick production	Export packaging generally wood based
Delivery		
Work tables/fixtures	Packaging, scribing, labelling operations	
Storage racks and fixtures	For dispensers, box and sheet storage	
Designated area	For finished goods staging, delivery activity	
Multiple small tools	For packaging and finishing operations	
Air compressor	For pneumatic and powdercoating	Air throughput and quality critical
PEOPLE	LEVEL	COMMENTS
Pan preparation	Semiskilled, trainable	Manual operation requiring some physical attributes
Burning	Unskilled with supervision	
First Tuning	Intermediate Level Tuner	Based on criteria established by PanlandTT
Coating		
Pretreatment, prep for coating	Unskilled with supervision	
Coating assistance	Unskilled with supervision	
Coating	Skilled	
Final Tuning	Fully qualified tuner	Experience and physical capability
Workshop Helper	Unskilled and semiskilled	
Welder/fabricator	Skilled/ trained with experience	Variable situations presented in production, facilities, tooling and maintenance
Woodwork	Semiskilled	for packaging
Stick production	unskilled	
Packaging/delivery	Unskilled trainable	For physical operation
	Sec school graduate	For clerical and control functions
Supervisors	Skilled, experience, sec education	Reporting functions, and some technical capabilities from experience

Production Control	Production, Inventory accounting and Information systems	
Quality Control	Sec education, knowledge of music, pan	Monitoring and reporting throughout prod system
Maintenance	Skilled, some outsourced	Equipment, tools, facilities
Engineering	Prod/Industrial Engineering capability	University or Tech School
Purchasing	Semiskilled, sec graduate	Experience is a substitute
Administration/IR/IT/Training	Qualifications necessary	

7. OUTPUTS FROM STEELPAN MANUFACTURING

7.1. PRODUCTS

Full Range of Conventional and Single Pan Steelband Instruments including:-

- I. Tenor (Soprano) Pan
- II. Double Tenor Pan Set
- III. Harmony Pan
- IV. Single Second Pan
- V. Double Second Pan Set
- VI. Single Guitar Pan
- VII. Double Guitar Pan Set
- VIII. Triple Cello Pan Set
- IX. Four Cello Pan Set
- X. Quadrophonic Pan Set
- XI. Tenor Bass Pan Set
- XII. Six/seven Bass Pan Set
- XIII. Nine Bass Pan Set
- XIV. Twelve Bass Pan Set
- XV. These Instruments all use standard 22.75 in dia. Drums



Oversized Steelpans – Driven by the G pan materials production and derivatives.

Undersized Steelpans including:-

- I. Mid size – 18 in dia
- II. Mini tenor – 15 in dia
- III. Minipan – 12 in dia
- IV. Pitipan – 10 in dia
- V. Mitipan – 8 in dia

Pentatonic Scale steelpans including:-

- I. Meditation pan
- II. Mini Penta pan

Pan Stands including:-

- I. Single fixed, adjustable and collapsible stands
- II. Double fixed and adjustable stands
- III. Stands for undersized pans
- IV. Special stands for physically challenged
- V. Racks for all conventional instruments

Sticks for all pans using various materials.

7.2. SERVICES

- I. Tuning/blending service
- II. Refurbishing of pans, stands, racks
- III. Coating services
- IV. Transportation services

7.3. SKILLS & CAREERS

- I. Specialist skilled Tuners
- II. Semiskilled tuners
- III. Panmakers (preparation function)
- IV. Welder/fabricator
- V. Powdercoater
- VI. Painter
- VII. General factory workers
- VIII. Teacher/instructor in Steelpan manufacture

7.4. ECONOMIC ACTIVITY

A major output of the steelpan Manufacturing Industry is the opportunity it presents for economic activity in communities that are challenged on many social levels.

Entry level qualifications of academic and work experience is minimal and skills can be developed by willing male or female, young and old persons with very little capital inputs. Careers can easily emerge from this demographic in a profession of international significance.

Communities will be enhanced with significant employment options and the consequent economic activity.

8. INNOVATION IN PAN MANUFACTURE

8.1. PRODUCTION SYSTEM INNOVATION

- I. Spinforming was an early method used for sinking of drums using high speed mechanical methods. There were technical issues which resulted in the method being discarded.
- II. Hydraulic pressing was also used in a major exercise by CARIRI and this too was abandoned eventually.
- III. Pneumatic hammers were introduced in the last ten years and becoming standard required for pan preparation operations. It facilitates better quality, faster production rates and lower operator fatigue.
- IV. Drums are being supplied with shorter skirts especially for front line pan production. Reduces waste (drum offcuts) and shipping cost making importation of such materials more attractive.
- V. Fixtures, clamps and templates are continually evolving which result in increased quality and productivity.
- VI. Powdercoating is the latest coating to be applied to playing surfaces in pan manufacture. It has great advantages in the areas of corrosion protection, abrasion resistance, impact resistance and production cost and time. It has also opened up tremendous colour options for instruments.
- VII. Stroboscopes have been in use moreso in the past 20 years. This equipment is fast evolving continually. Computer programs are now available which are also improving daily and gradually replacing the strobe machines.

The G pan series was launched within recent times and has served to secure the Intellectual property of the steelpan for Trinidad & Tobago. Introduction of these products have also made larger diameter materials available for steelpan manufacture.

8.2. INNOVATIONS TO IMPROVE CURRENT PRODUCTS

- I. The G pan series was launched within recent times and has served to secure the Intellectual property of the steelpan for Trinidad & Tobago. Introduction of these products have also made larger diameter materials available for steelpan manufacture.
- II. Larger diameter instruments enable greater note ranges and stronger sound reproduction for certain voices. Tuners are becoming more used to working with these materials and the result will be improving quality generally over time.
- III. Stands and sticks are continually being produced with innovative designs and new materials. The results are mainly adjustments in functionality and aesthetics.

- IV. New materials have been tried for steelpan manufacture with limited success. The most publicized attempt was the use of stainless steel using a hydroforming press to mass produce prepared pans. The materials did not hold the tuning and the project died.
- V. Note layouts and ranges of conventional instruments have evolved over years. However innovations in this area seem to have slowed as there is a greater need for standardization of steelband instruments. Front line instruments are gravitating slowly but surely to standard accepted formats.

8.3. NEW PRODUCTS FOR NEW MARKETS

- I. The G pan series have introduced a new range of products but the target markets are unchanged
- II. Powdercoating has introduced a new range of colours to steelpans which can target a lower price-point market
- III. A range of miniature pans are being produced to target the early education, gift and toy markets which are high potential simply because of the enormous size of the total markets .
- IV. A comprehensive assessment of the market for the steelpan will produce new directions and products for new markets

9. DIRECTION OF THE STEELPAN MANUFACTURING INDUSTRY

9.1. PRESENT STATE

9.1.1. MANUFACTURERS

The existing industry consists of a significant number of entities and individuals engaged in the manufacture and sale of steelpan and accessories.

Manufacturers can be categorized broadly as follows:

- I. Major – employing over 15 persons on full or part-time basis. Generally employs marketing and proactive sales strategies. Use of property of significant size and cost.
- II. Shop – smaller group organized to produce with mainly contract employees. Domestic or panyard based or use of small shops but with permanently installed tools/equipment
- III. Individual – Operations centered on an individual tuner or pan maker who will subcontract other skills and services. Generally home or community facilities used.



9.1.2. FACILITIES

Larger facilities generally use warehouse/factory shell space, have installed air and controlled spaces for tuning and preparation and may also include coating operations of varying capabilities.

Space considerations in all facilities will determine capacity as storage for raw materials, work-in-progress and finished goods is always a major factor.

Factory space is expensive and can only be justified where the manufacturer has established business which will create consistently high demand throughout the year. Very few manufacturers qualify resulting in an industry of mainly cottage-type operations. Development of the industry will come from

the growth of these smaller operators with steady market demand. The facilities will evolve in standards and capability accordingly.

9.1.3. LABOUR/SKILLS

Availability of skilled labour is the main factor that currently determines the capacity of the industry. The long learning curve for accomplished tuners (average 5 years) imposes limits on pan production which becomes most evident whenever major supply is being considered. The School Program of the Ministry of Education is a clear example as production could not respond to produce quality pan sets for more than 30 schools per year in 2009. There has been improvement since then but not major.

Training in the higher level skill of tuning has been limited and sporadic in the past and although programs have been introduced by UTT and other entities, production of these skilled persons has been slow. Training of panmakers (up to preparation stage) has been more successful as the requirements are less demanding.

Training of tuners to acceptable levels for quality output is very challenging as it involves a long learning/instruction curve, continuous exposure and individual production under instruction. This combination is difficult to organize hence training programs currently offered have been only complimentary and incapable of producing fully skilled tuners.

The Ministry of Education is in the final stages of implementing the subject of Panmaking in its TechVoc curriculum in the Secondary school system and are looking at the career opportunities in this area. This is an encouraging sign which may result in consideration for continued training at the next level.

The industry will continue to be limited due to the labour factor and a major and urgent intervention is necessary if the objective of expansion is to be considered.

9.1.4. TOOLS/EQUIPMENT/TECHNOLOGY

Equipment, tools and methodologies are fundamentally the same among producers of steelpans with some using more advanced equipment but with same functions. Reality is that even in the existing manufacturing systems, the technology and equipment used are basically the same with some limited mechanisation allowing for faster output at the lower skilled stages. The tuning method however does not vary much across establishments and this skill remains the determining factor for finished goods production.

For a major production increase, a manufacturer will engage more people, many of whom operate on a contract basis which is more the norm in the industry. Generally increased tooling is not a factor and may be added without much effort.

Current Technology and methodology are overdue for a major comprehensive review as existing manufacturing technology of similar products or forms will deem our production systems and methods to be antiquated. There is simply too much modern metalworking available for us to be stuck where we are. Quality and productivity and the resultant cost considerations are derived benefits.

This position is however tempered by the tuning technology and methods which will take a greater effort for application of new technology. But this also is surmountable at least to an extent which will reduce the work and reliance on the individual tuner.

9.2. OBJECTIVES/DIRECTION

From the foregoing the following can be derived:-

- I. The Steelpan Manufacturing Industry represents an industrial opportunity for Trinidad & Tobago second to none outside of the energy sector.
- II. It has the potential to generate major employment at all levels
- III. The opportunity for economic and social impact especially in challenged communities is unmatched
- IV. With the requisite market development, it has tremendous potential for foreign exchange earning with mostly local inputs
- V. The industry has not been the recipient of any concerted strategic direction or influence from state or private quarters and hence has evolved naturally on its own
- VI. Major capital has not been attracted to the industry as market development has been limited by capabilities to produce in which little has been invested. The niche character of this market still endures and will not attract investors without a case being made from proper analysis of potential
- VII. The foundation exists from which a major, thriving industry can be built.
- VIII. The market analysis which has not been a subject of this report will critically inform strategic objectives and must form part of the exercise

The Objectives must be:

- I. Strategically develop the Steelpan Manufacturing Industry in a comprehensive manner driven by the results and strategies from a comprehensive market analysis
- II. Create major economic opportunities and a broad cadre of entrepreneurs at all levels in this industry
- III. Create major employment and career opportunities for persons and communities where such opportunities are limited at this time
- IV. Make the Steelpan manufacturing Industry the largest non-energy sector industrial activity in the local economy
- V. Reinforce the status of Trinidad & Tobago as the world's supplier of Steelpan and all related activities

9.3. RECOMMENDED ACTION

The following must be undertaken for this Industry:

- I. Comprehensive Study and Analysis inclusive of all aspects of the Industry.
- II. Comprehensive Study and Analysis of the Markets for products of the industry.
- III. A Strategic Plan which will inform the direction and policies attendant to the industry.

The bigger picture suggests that the separation of The Music vs The Instrument as identified in (4.1) above, whilst used to qualify this report, cannot be applied in any Strategic forward path. The market will necessarily determine what must be produced and market strategy will drive the strategy for the manufacturing industry.



10. PROPOSED PROJECTS

The following are Projects which should be undertaken at this time with the above objectives in mind:

10.1. THE INDUSTRY.

A comprehensive Assessment of the local and International Steelpan Industry to include:

- I. Number and level of skilled and semi-skilled workers actively engaged and their locations.
- II. Establishments in the industry by type, size, capabilities, history and expansion plans.
- III. Facilities audit including type of tenure, size, equipment.
- IV. Production output history and future projections.
- V. Technologies in use and at development stage, in the field or in the lab.
- VI. R & D activity and achievements.
- VII. Service activity, skill availability.
- VIII. Trends in methods, skills, equipment.
- IX. Training activities – history, present and planned and Accreditation regime including the School system.
- X. Compensation study to include working conditions and all variables.
- XI. All products manufactured including hybrid models.
- XII. Materials sources, specifications.
- XIII. Standards documented and assumed.
- XIV. Quality assurance issues.
- XV. Safety practice and standards.
- XVI. Intellectual Property status and attendant issues.
- XVII. Organisations involved with governance and policy making, their roles and effectiveness.

The list is by no means exhaustive but the assessment must result in a picture of the current state of the industry, its resources and capacity, trends and projections in all aspects of manufacturing.

The result of the assessment will identify the poles on which future development will be based and will guide any strategic planning going forward.

10.2. THE MARKET.

The global market for steelpan must be assessed.

Whilst interest has been high especially following performances, commitment to purchase and use of the instruments has been less so for many reasons. Understanding and addressing these concerns can change the picture of potential demand but the current state will not change on its own.

The market assessment must include:

- I. History of demand.
- II. Geography of demand by country, territory, region.
- III. Trends in purchasing considering the improving knowledge of consumers.

- IV. Supply regime and suppliers – distributors, dealers, consumers.
- V. Identification of demand drivers and trends.
- VI. Traditional markets and maturity.
- VII. New markets.
- VIII. Future markets.
- IX. Segments/ products.
- X. Market Development.
- XI. Demand – Actual vs Potential.
- XII. Promotional Strategies.
- XIII. Product Sales.
- XIV. Support services.
- XV. Online marketing and e-commerce.

The analysis of information resulting from the study of markets for steelpan products and all related services will determine and guide the way forward for the manufacturing industry. The level of investment, training and development of capacity is a direct function of this analysis.

10.3. STRATEGIC PLAN

The results of the Industry and market assessments will be used to determine the way forward for the Steelpan manufacturing industry and will be used as substantial inputs in formulating a Strategic Master Plan for the industry which will be the platform for state and private intervention and investment and allow informed decision-making at all levels.

Government, Pan Trinbago, private enterprise and all other stakeholders must be included in the exercise of strategic planning and consultation which will use tried and tested methods to arrive at the finished plan.

The resulting template will be the platform of growth and development of this high potential industry and will guide policy, strategy and incentives needed for acceleration.