THE PHILIPPINE WELDING FABRICATION INDUSTRY

A 2016 Study

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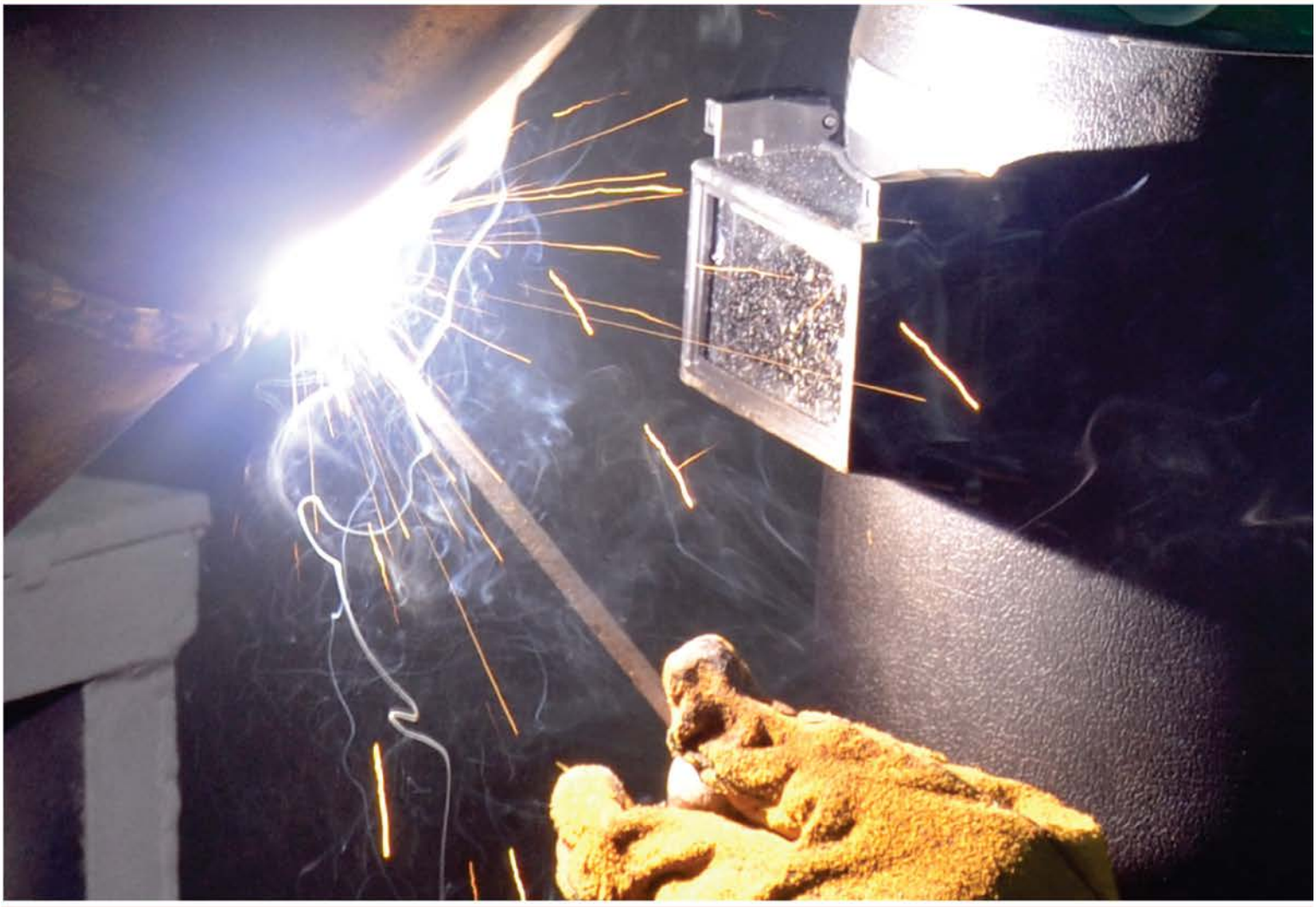

DEPARTMENT OF SCIENCE AND TECHNOLOGY
METALS INDUSTRY RESEARCH AND DEVELOPMENT CENTER

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The Cover: Welding competition in MIRDC.

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FOREWORD

The Department of Science and Technology - Metals Industry Research and Development Center (DOST-MIRDC) eagerly and zealously pushes forward the metals, engineering, and allied industries in the forefront of technology and economic growth through benchmarking activities, sustained efforts to bring the industries to where we envisioned them to be, and continued collaboration with industry players, R&D partners, relevant government institutions, and consultants from both public and private sectors. The DOST-MIRDC has been involved in innovation through benchmarking activities, special mention of which is the project entitled "Establishment of the Advanced Mechatronics, Robotics, and Industrial Automation Laboratory (AMERIAL)" that took the Center's key officials and personnel to Taiwan, Thailand, Japan, and Spain. Learning experiences from such activities help us develop new perspectives instrumental in creating a big impact in the metals and engineering (M&E) industries. Through these efforts, the DOST-MIRDC's mandate of being in the midst of information exchange with both the government and the private sector, especially policymakers and industry players, is better realized.

The DOST-MIRDC conducted the Philippine Welding Fabrication Industry: A 2016 Study as an update of the previous study published in 2004. Also, in 2012, a profiling study of the seven sectors which includes the update of the status of the welding fabrication sector was conducted. The industry study determined the status of the welding fabrication industry through identification of the industrial, market, and technical profile, including the business outlook, expectations, problems and issues encountered including expansions plans of the welding company-respondents. The study emphasizes the over-all performance of the welding fabrication sector for the period 2012 to 2014.

The management recognizes the leadership, analytical minds, and expertise of Dr. Danilo N. Pilar, Chief of the Technology Diffusion Division (TDD) and Ms. Lina B. Afable, Chief of the Technology Information and Promotion Section (TIPS). The Center's appreciation and gratitude also goes to the Philippine Statistics Authority (PSA), headed by Dr. Lisa Grace S. Bersales, National Statistician and Civil Registrar General, who cleared and approved the DOST-MIRDC's 2015 survey of the Metalworking Industry - Welding Sector. The preparation of the survey instrument, study proposal, actual data collection, consolidation, analysis, and finalization was made possible through the collective effort of the Industry Research and Study Unit (IRSU) team members namely: Rosalinda M. Cruz; Jim Patrick S.D. Erispe; Josephine R. Esguerra; Ma. Rodessa Grace A. Mercado; and Engr. Eldina B. Pinca. The efforts of writers and editors as well as the dedication and support of Engr. Felipe S. Pachoco and Engr. Benjamin V.D. Estrellado, PME, DOST-MIRDC's extension officer and DOST regional office staff, respectively, and Dominador Tosh Eleazar of the Philippine Welding Society are sincerely acknowledged.

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INTRODUCTION

Welding in the Philippines continuously serves as a critical enabling technology for various industries predominated by metals. The process of joining metals becomes more sophisticated and is now more focused on adding value to welded products needed by most industries. In recent years, welding became a center of attention in the metalworking sector as the processes involved in welding activities are more intricate compared to other industries with bigger machine operations. Welding processes depend more on the use of human judgment to ensure quality of welded products, thus require welders to have higher technical capabilities. Considering that the welding process is knowledge-based, innovation is a vital element for the growth of the industry.

Most industries that are continuously expanding such as construction, infrastructure, and development mining find welding process as a vital part of their operation. Moreover, the welding process is also one of the widely used procedure in manufacturing with promising production demands from automotive, shipbuilding, aerospace, furniture, and agriculture industries, to name a few.

Welding jobs are evidently more expensive in developed countries; thus the need to outsource welding jobs from countries with emerging economies like the Philippines became widespread. While the capability of the local welding fabrication industry becomes subject for assessment to see if the demands for welding services and products are met, the information on its productivity has very limited reports and analysis in the past.

The DOST-MIRDC developed a welding industry report in 1994. Contained in this report are information about the industry's general profile, market profile, and technical profile. Also discussed are the problems encountered and prospects targeted by the respondents. In a span of two decades, the demands from different sectors catered to by the welding industry have been attracting companies with welding services to scale up their operations and enhance competitiveness through business development. The inflow in demands of both services and supply of welded products from developed countries to economically developing countries like the Philippines evidently validates the need to reassess the status of the industry as well as the existing policies that support the development of welding businesses in the country. The analysis of the descriptive data from the welding industry survey aims to bring empirical evidence whether or not the welding industry has undergone evolution in the past two decades.

The present study on the welding fabrication industry is divided into four areas: general profile, market profile, technical profile, and strengths, weaknesses, opportunities and threats to the industry. These information aim to provide a descriptive overview of key elements that encompass the understanding of the industry's current capability in connection with the emergence of new markets for the welding fabrication industry. Moreover, the prospective view of respondents in relation to their future plans and how these plans fit the growing demands for quality welded products and services are also discussed. Providing such crucial information of the industry is deemed to contribute far and wide to the relevant understanding of the industry's capability and needs that can further be escalated to the attention of policy makers, organizations and associations that support the welding fabrication industry and the different sectors it serves.

OVERVIEW OF THE WELDING INDUSTRY IN THE PHILIPPINES

In the trend that played across the 1994 welding industry study, it was noted that the local welding industry has been more focused on the conventional welding processes and methods despite the fact that neighboring countries were already shifting to modern welding processes, such as automated technology and robotics. The industry during that time was dominated by micro enterprises and is focused on repair services and jobbing activities. As such, with small investments, traditional welding process particularly Shielded Metal Arc Welding (SMAW) became a household name for welding activities. Moreover, the extreme popularity of the welding industry in the Philippines appears to be commonly focused on its manpower development through the existence of different local welding training programs.

The advantage, however, of focusing on the development of the local welding workforce can be elucidated by an illustration of how a welding industry operates. As described by Gyasi (2013), various operations in the welding industry are comparable to an 'ecosystem' due to the existing interdependency between the different welding groups and welding workforce. Figure 1 demonstrates this claim :

Figure 1. Simplified Diagram of the Welding Industry and its Fraternities

As shown, the welding workforce is a great contributor in the industry as it coordinates the needs of various welding fraternities. The welding workforce in the country is strengthened by trainings provided by various welding education and training groups. The DOST-MIRDC, for one, provides training on Tungsten Inert Gas (TIG) Welding on Carbon Steel Plates and Gas Metal Arc Welding (GMAW) / Metal Inert Gas (MIG) – Metal Active Gas (MAG) Welding on Carbon Steel Plates. The Technical Education and Skills Development Authority (TESDA), on the other hand, being the Technical Vocational Education and Training (TVET) authority in the country, ensures that the economy's trained manpower requirement is met. TESDA offers training courses on welding particularly Gas Tungsten Arc Welding (GTAW), Electric Arc and Gas Welding, Thermoplastic Welder, Submerged Arc Welding, Flux-Cored Arc Welding (FCAW), GMAW, SMAW and Welding Carbon Steel Plate Pipes Using SMAW. The welding workforce applies relevant knowledge in determining the capability of the industry in providing the proper welding solutions for end users group. They also become capable of informing the welding material and equipment supply group on the relevant technological needs of the welding industry to ensure that proper service developments are achieved.

The local welding workforce, through welding associations, becomes systematically advanced in technological know-how of the welding processes. The Philippine Welding Society (PWS), for instance, aims to empower the Philippines' welding workforce by providing seminars and trainings for welding engineers, welding inspectors, and various welding practitioners. Such trainings are developed to groom local workforce to be eligible for international standards and qualificaton. The international linkages of the PWS to different associations, such as Asian Welding Federation (AWF), American Welding Society (AWS), Japan Welding Engineering Society (JWES), Singapore Welding Society (SWS), Welding Technology Institute of Australia (WTIA), and Pacific Ocean Coalition of Welding Associations (POCWA) make the technical updating amenable for the local industry. Alliance with international associations keeps the local industry abreast of the information on current global welding trends.

Being updated on the welding trends may not be of value if the local industry cannot particularly address the concerns of its development. The operational balance of the industry cannot be fully determined as there are limited information from the welding material and supply group. As reported in the 2012 Philippine Metalworking Industry Profiling Study of the DOST-MIRDC, inadequate quantity of available raw materials and welding supplies is frequently reported as one of the most prevalent issues faced by the welding industry. SMAW and Oxy-acetylene Welding (OAW) equipment are among the most commonly used equipment reported by the industry and about 61% were acquired in brand new condition but were not indicated if imported or locally purchased. Since the last industry report of the Center, the welding industry gradually faced changes in terms of demands and streamlined operations, hence, assessing the sustained advances of welding equipment should be done in anticipation of reinforced uptake in technological development.

As the fundamental vehicle of change, sophisticated technologies on welding and fabrication must be intensively adopted by local firms. Very few large companies are catering to the needs of the industries that need large volume of welded products and extensive welding services, but the industry as a whole cannot put a strong foothold on the manufacturing industry as it fails to provide a long term solution to the industry's needs with such limited technology. While it is clear that expanding automation in the welding processes contributes to decreasing manufacturing costs and improving the quality of welded products, funding initiatives to fill the gap in technological advancement of the domestic welding industry has not been addressed completely.

According to the DOST-MIRDC's 1994 Welding Industry Study, the transport, construction, and agriculture industries were among the biggest market served by the welding industry. Knowing that there are emerging markets such as the aerospace, shipbuilding and repair, automotive, and other metal fabrication sectors, welding firms are getting more involved in the trend but are finding it hard to embrace new opportunities from the upward trend in demands as not all firms are fit to match the requirements of other industries.

Aside from problems on raw materials and supplies, the industry also faced other challenges including lack of technical support, manpower issues (i.e. job-related performance, low productivity, and high employee turnover); and lack of marketing strategy. Considering these, the status of the industry will be re-assesed using the welding survey data gathered from 2015 to 2016.

RESEARCH OBJECTIVES, METHODOLOGY, AND LIMITATIONS OF THE STUDY

Research Objectives

Relative to the review of the 1994 Welding Industry Study and the 2012 Philippine Metalworking Industry Profiling Study conducted by the DOST-MIRDC, the present study uses an approach that puts an extensive effort in assessing the current status of the welding fabrication industry in the Philippines. The specific objectives of the study are as follows:

1. To make an assessment of the welding fabrication sector in the Philippines in view of its need for facilities upgrading, workforce skills development, and investment incentives;
2. To identify the technical capability as well as the issues and concerns of local welding firms that should be addressed by the government;
3. To come up with an updated and consolidated information on welding firms that can be used as planning and programming tool to effect the development of the industry; and
4. To determine the most appropriate programs to be implemented by concerned organizations, public and private alike, to significantly strengthen the local welding fabrication sector.

Methodology

To carry through the updating of the data on the welding fabrication industry of the Philippines, the IRSU team of the DOST-MIRDC surveyed welding firms and other metalworking companies employing welding operations located across the country.

The respondents of this study were identified from the available lists of welding firms sourced from previous DOST-MIRDC studies, internet, local government units, and the Department of Trade and Industry (DTI). The list identified about 1,400 establishments that belong to the welding industry. The survey team targeted 1,050 welding firms or 75% of the total number through purposive sampling. Out of the 1,050 survey forms collected, nine (9) were excluded from the sampled population due to invalid data. Only 1,041 filled out questionnaires were consolidated and analyzed for the study. The questionnaire used was designed based on the format of the survey form used in the profiling study and previous surveys and was specifically modified for the welding fabrication industry.

The analysis part of this study is carried out in three stages. First, the data collected from the survey are presented to effectively describe the local welding fabrication industry's general profile and market profile, status of the technical capability of the industry, and the identified strengths, weaknesses, opportunities and threats to the industry. The second part consists of industry analysis to assess the status of the welding fabrication industry relevant to the trend in welding operations and technical requirements to meet the present demands of the industries catered to by the local welding industry. The last part summarizes the findings of the study and provides recommendations to address the needs of the industry.

Limitations of the Study

The survey team recognizes that the data presented in this study may be characterized by inadequate figures provided by the survey respondents. Although the purpose of the survey was carefully explained to the respondents, most were still reluctant to provide data particularly these relating to sales, market, materials, and welding equipment. To come up with comprehensive findings, secondary data from various local and foreign welding references are used to supplement the data collected from the survey.

INDUSTRY PROFILE

Geographical Distribution of Welding Shops

The welding fabrication industry is known to be geographically diverse due to its extensive use in various application in joining of metals. Table 1 shows the geographical distribution of welding shops surveyed by the DOST-MIRDC.

Table 1. Geographical Distribution of Welding Shops

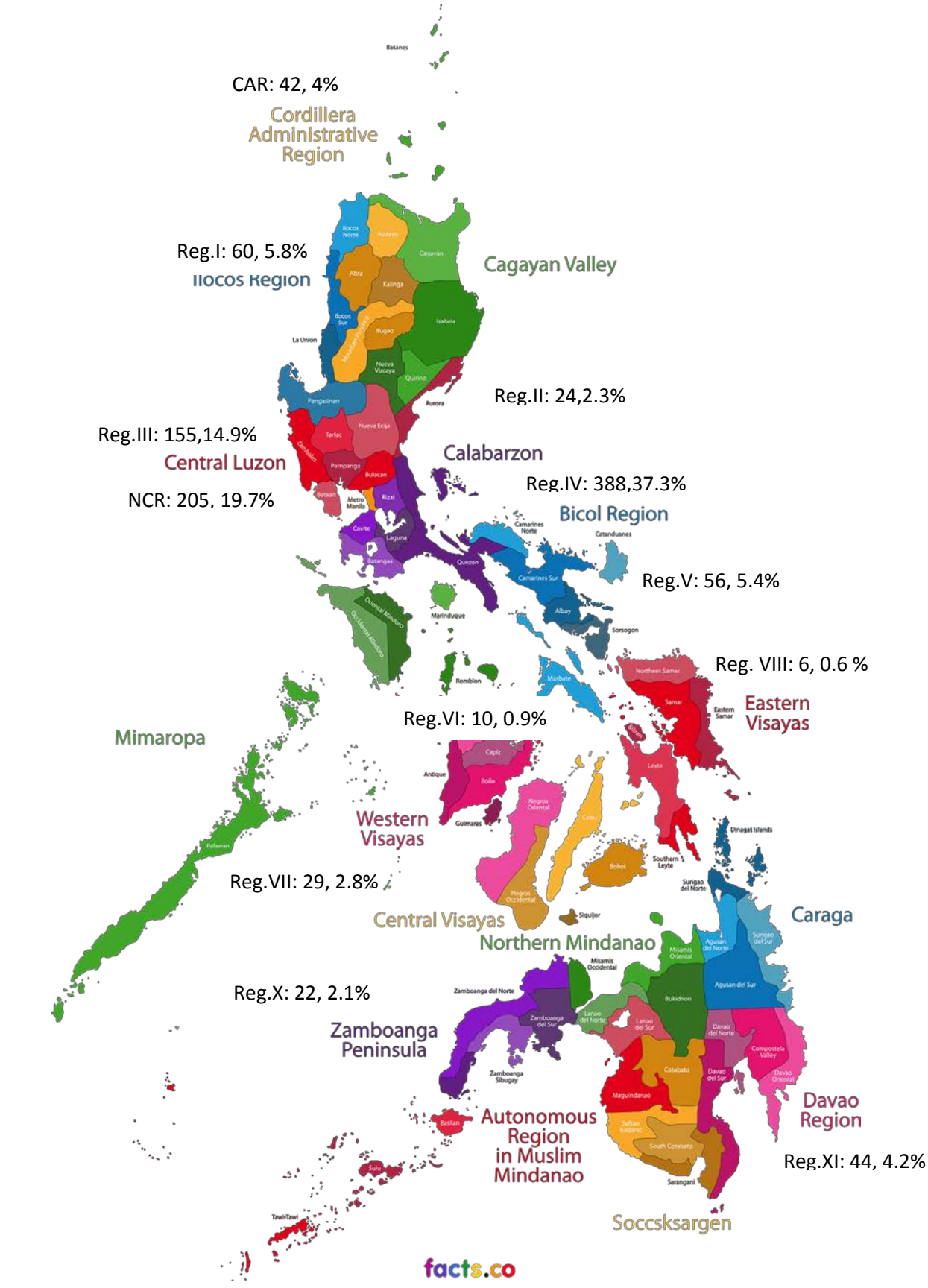
REGION	No. of Shops	% Share
NCR	**205**	**19.7**
CAR	**42**	**4**
REGION I	**60**	**5.8**
REGION II	**24**	**2.3**
REGION III	**155**	**14.9**
REGION IV	**388**	**37.3**
REGION V	**56**	**5.4**
REGION VI	**10**	**0.9**
REGION VII	**29**	**2.8**
REGION VIII	**6**	**0.6**
REGION X	**22**	**2.1**
REGION XI	**44**	**4.2**
Total Number of Shops	**1,041**	**100%**

As shown, the biggest number of welding shops is in Region IV, comprising of 37.3% of the total shops. 205 welding shops or 19.7% are located in the National Capital Region (NCR) and 155 welding shops or 14.9% are in Region III. The smallest number, six (6) shops or 0.6 percent, is located in Region VIII. Despite the diversity of locations of welding firms, what can easily be noticed from the data is the concentration of welding businesses in the most industrialized regions. It is rather considered cost effective for most welding firms to establish business in areas that are home base for welding processes. Region IV, where most welding operations exist, is an area known for extensive progress due to a number of foreign locators in economic zones. Among the investment priority areas that may be linked to the number of welding investments in Region IV are electric/electronic products, metal furniture, machinery and components, construction materials, shipbuilding, consumer durables, and other metal manufactures[1]. Figure 2 reflects the geographical distribution of of welding shops .

Year Established

The rise of industrialization in regions outside Metro Manila allowed different investment firms to enjoy business operations integrated with attractive incentive packages. A strong coordination of business mechanism between Special Economic Zones and various establishments in the country is seen as a contributor to continuously increasing business in the country.

[1] Department of Trade and Industry, Region IV cited in Austria (1998). The Emerging Philippine Investment Environment



google.com.ph

Figure 2. Geographical Distribution of Welding Shops

Figure 3 presents the year of establishment of welding shops. As presented, there is a continuous increase in the number of establishments per decade. From 1981-1990, there are 79 welding shops established and 201 welding shops were added from 1991-2000. In the following decade (2001-2010), 326 welding shops were added and started their operations. An impressive increase in the number of welding establishments was noted from 2011-2015 with 294 establishments added in a span of four years.

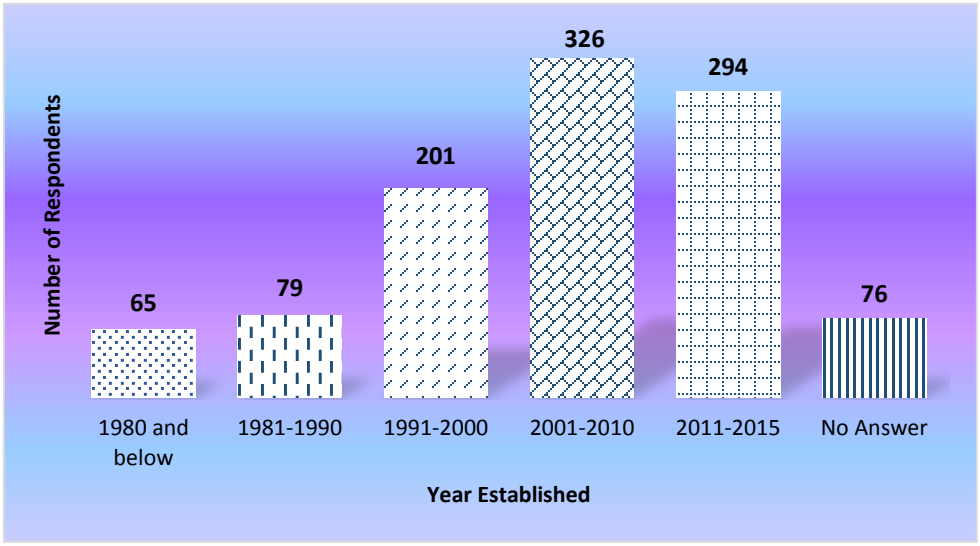


Figure 3. Year of Establishment of Welding Shops

Form of Business Organization

Figure 4 indicates the form of business of welding shops. As indicated, it is evident that the welding fabrication industry is composed mainly of single proprietorship businesses. Businesses under single proprietorship requires minimal amount of capital, and are subject to lesser regulations and monitoring requirements compared to corporations. Out of 1,041 welding firms, 931 shops or 89 % were established through single proprietorship, while 94 shops or 9% are established as corporation. The remaining shops exist as foundation (4 responses) and as partnership (3 responses). A total of nine (9) respondents opted not to disclose how their businesses were established.

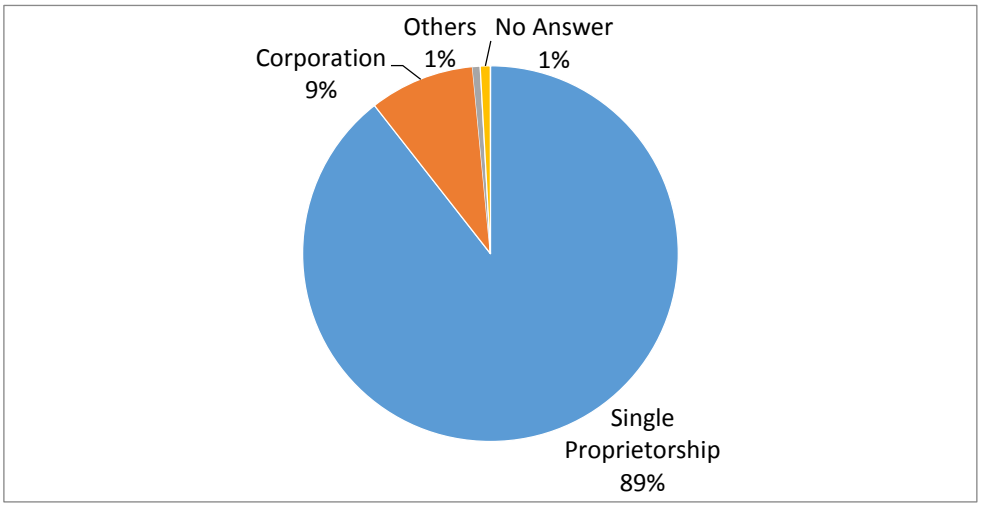


Figure 4. Form of Business Organization of Welding Shops

Type of Business Organization

The type of businesses in the Philippines can either be independent or captive. Independent businesses have more opportunities to look out for their customers' different interests as they are not confined to specific needs of a particular company. On the other hand, in-house or captive shops have an in-depth knowledge about their customers' service requirements as they make products for a particular customer. The welding fabrication industry serves different sectors and mostly requires a wide spectrum of services and specialization to meet different demands. Figure 5 shows the type of business organization of local welding shops.

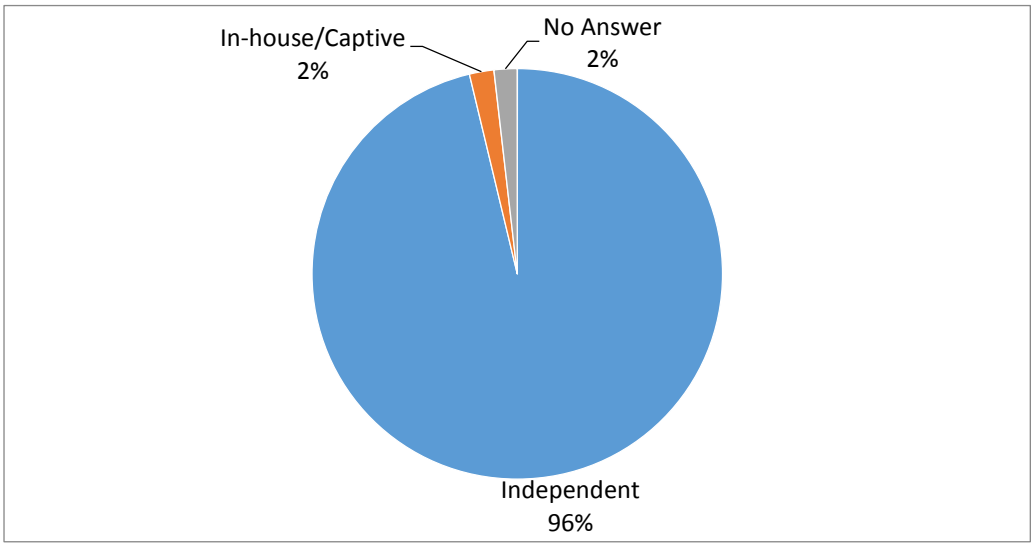


Figure 5. Type of Business Organization of Welding Shops

As shown, it can be noted that since welding shops are serving various customers, the existence of independent shops is more prevalent than captive shops. 1,001 out of 1,041 or 96% of respondents are classified as independent type of business, while only 20 respondents or 2% reported that they are the captive type of business. Most of the welding businesses opt to be more flexible in terms of welding operations to serve more customers thus, they operate as independent shops. Those who are able to keep regular customers are confident in specializing operations for a specific manufacturing process since they are engaged in a long term business activity. The remaining respondents did not provide answer about their type of business.

Type of Welding Businesses

Jobbing activity is generally part of a manufacturing system. The specific jobbing activity in this study, however, is differentiated from that of the manufacturing activity as it is described as a method of welding a specific product engineered to order. This type of activity may require only a single welder or if the requirement is too intricate, may require a group of more skilled welders. It may therefore be considered that the manufacturing business is a product-focused activity while the jobbing activity is more process-focused.

The local welders in the country developed a specific trend of marketing focus as evidenced by their choice of business type. Figure 6 presents the type of welding businesses. As presented, 75% of the respondents are into jobbing business, while 14% are into manufacturing. Likewise, 8% of the respondents are accepting both manufacturing and jobbing jobs.

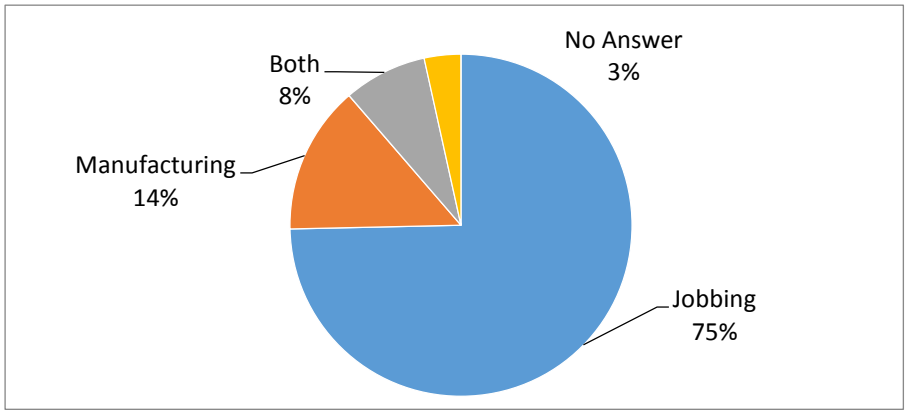


Figure 6. Type of Welding Businesses

Classification of Business

In the Philippines, businesses are classified based on employment and in terms of assets. In general, micro, small, and medium enterprises (MSMEs) constitute 99.6% of the total number of establishments registered in 2008 and are therefore dominating the economy. From the 2006 data, microenterprises constitute 90% of all the businesses in the manufacturing sector. Firms in the fabricated metal products, excluding machinery and equipment, totalled about 11% (Aldaba, 2012). Table 2 presents a description of MSMEs based on assets and number of employees.

Table 2. Classification of Business in the Philippines

Classification	Based on Total Assets (in ₱)	Based on Number of Employees
Micro Enterprise	3,000,000 or less	1-9 employees
Small Enterprise	More than 3,000,000 but less than 15,000,000	10-99 employees
Medium Enterprise	More than 15,000,000 but less than 100,000,000	100-199 employees
Large Enterprise	More than 100,000,000	200 or more employees

Figure 7A and 7B show the distribution of welding businesses categorized according to assets and number of employees, respectively. In terms of assets, Figure 7A shows that 72% of the respondents (730 out of 1,041) belong to the micro enterprise. As observed during the survey, most welding shops, especially in provinces, are operating as a one-man shop requiring minimal capital. Welding shops that belong to the small enterprise stood at 86 (9%), medium enterprise with 45 respondents (4%), and only eight (8) respondents (1%) belong to the large enterprise category.

In terms of number of employees, Figure 7B also reflects the prevalence of micro enterprises. As previously mentioned, the welding business can be started with minimal capital and may not require a large number of employees. An entrepreneur with few welding who skills may start his own welding business or may hire just one person with advanced knowledge in welding that can accommodate different welding services needed by customers. 821 out of 1,041 or 79% of the respondents employ less than 10 employees, thus belonging to micro enterprise. There are 152 respondents (15%) categorized as small enterprise; 22 respondents (2%) belonging to medium enterprise, and 11 respondents (1%) that are categorized as large enterprise.

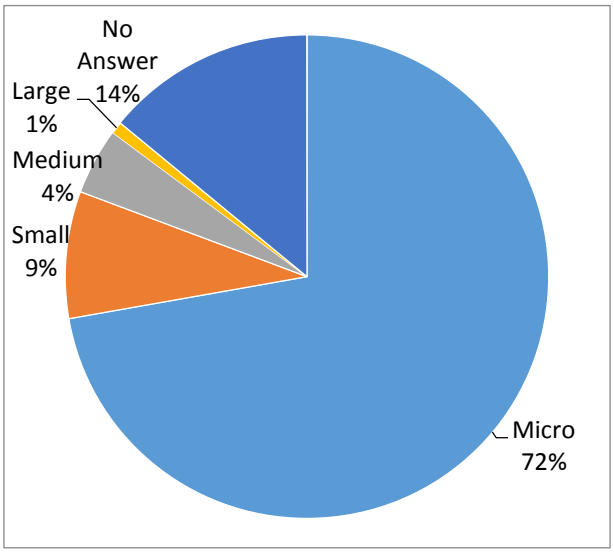


Figure 7A. Distribution of Welding Business According to Assets

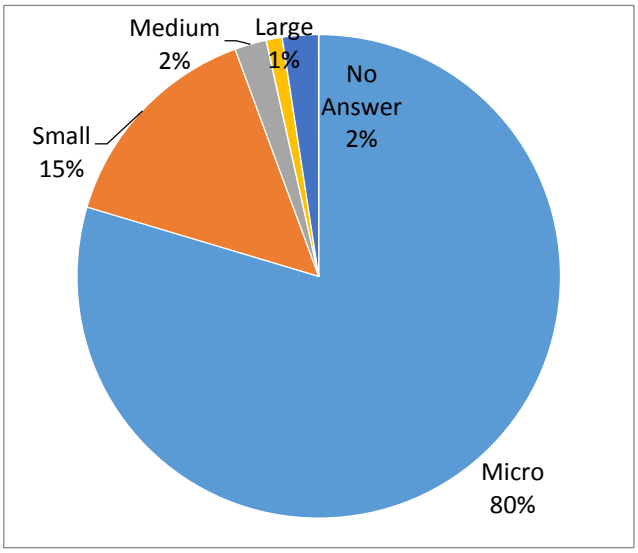


Figure 7B. Distribution of Welding Business According to Number of Employees

The welding fabrication industry, although dominated by micro enterprises, is still dependent on the large enterprises' contribution in terms of employment as the data collected for this study reports that large-scale welding firms are found to employ 59% of the total welding workforce.

Considering the contribution of MSMEs in the economy, the DTI created an MSME Development Plan that aims to boost local business activities. The MSME Development Plan is composed of four strategies that include: (1) Promoting a Business Enabling Environment; (2) Enhancing Access to Finance; (3) Enhancing Access to Markets; and (4) Improving Productivity and Efficiency. If this effort reaches the MSMEs in the welding fabrication industry, the prospect of upgrading can be easily attained.

Other Metalworking Processes Employed In Welding Firms

Most businesses with welding process in the Philippines are employing other metalworking processes to meet various requirements of their customers. As seen in Figure 8, machining is listed as the most common metalworking process employed in welding business with 254 responses. Other welding shops also offer other metal working processes such as tool and die (32 responses); press working (22 responses); electroplating (14 responses); metalcasting (13 responses); stamping (13 responses); heat treatment (7 responses); and metal fabrication (5 responses). The connection between the machining and welding process entails a set of metalworking dynamics. Most businesses encountered during this survey are welding and fabrication shops that employ cutting, bending, and assembling process. Machining, as part of the fabrication process, removes unwanted materials from a metal workpiece. The machined parts are then assembled and welded into place. In most establishments that employ other metalworking processes in their operation, welding is not always the primary job function. However, knowledge in welding significantly contributes to engagement in bigger production of metalworking firms as it provides ease of action to the fabrication and manufacturing process.

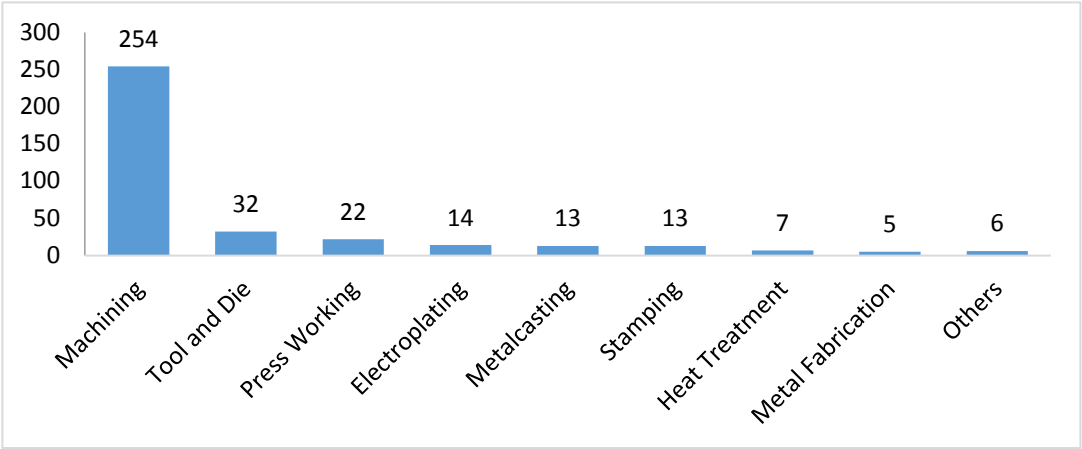


Figure 8. Other Metalworking Processes

Note: Multiple responses

Classification of Employees

Employees are considered as one of the lifebloods of any business. The survey respondents reported a total of 18,779 employees. From this total number, 8,798 are classified as production personnel; 1,125 are non-production personnel; 491 are contract workers, 19 belong to “others” category, while the remaining number was not specified by the respondents. Figure 9 illustrates this distribution.

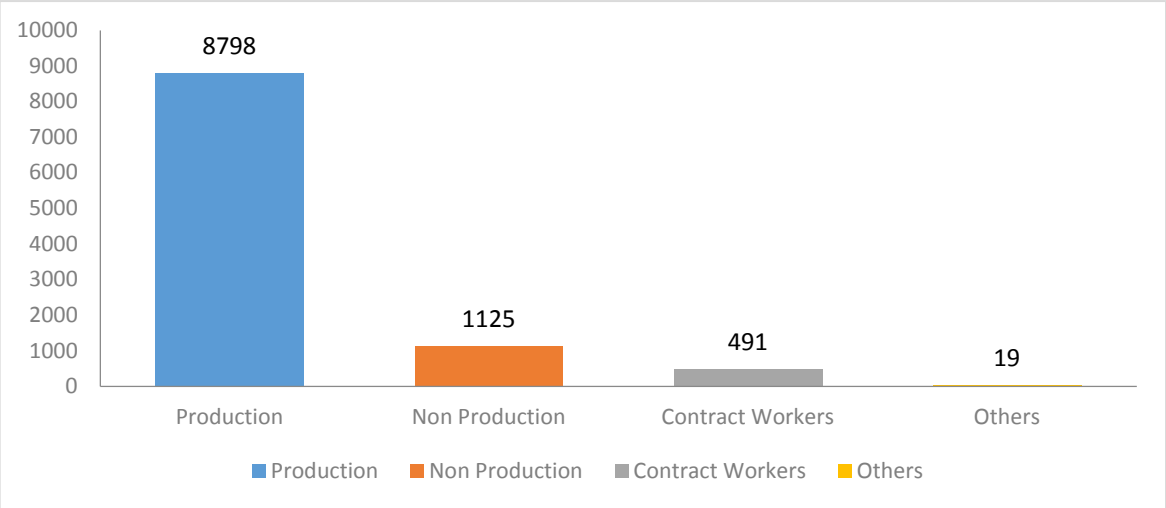


Figure 9. Classification of Employees in Welding Firms

The number of production personnel reported by the respondents was further classified based on their training experience. Production personnel include managers, engineers, supervisors, quality control inspector, welders, technicians, operators, and maintenance workers. It can be noted from Table 3 that the number of production personnel with formal training are higher compared to those without formal training.

Table 3. Classification of Production Personnel

Production Personnel	With Formal Training			Without Formal Training		
	Male	Female	Total	Male	Female	Total
Manager	280	67	347	109	60	169
Engineer / Supervisor	59	10	69	10	1	11
Quality Control Inspector	54	8	62	40	2	42
Welder/Techinician / Operator	3,971	672	4,643	2,566	48	2,614
Maintenance Worker	109	1	110	212	12	234
Total	4,473	758	5,231	2,937	123	3,060

An interesting long term outlook in terms of occupation projection of the welding industry in the U.S. was discussed by Derwart et.al. (2008) wherein they ranked the welding occupations based on how fast the employment is expected to increase or decrease during the projection period.[2] An indication of large positive percent change indicates a promising employment projection while larger negative percent change tells otherwise. Based on their findings, welders have the fastest growth projected for employment between the years 2006-2016 with 5% projected growth followed by welding technicians that are expected to have little or no change in employment as indicated by -2% to 2% change. Employment of welding inspectors are said to decline slowly or moderately with -3% to -9% change.

If compared to the data collected for the local welding industry, there appear to be a similar trend of employment in the Philippines, as the number of welders and operators are substantially higher compared to the number of welding inspectors. This suggests the need for more welding inspectors that will ensure the quality of welded products produced locally.

[2] Long-term projections are used by education and training program planners to estimate the location and size of programs needed to fill the projected demand. Occupations are ranked according to percent employment change which indicates how fast employment is expected to increase or decrease during the projection period.

MARKET PROFILE

In almost all industry surveys under the metalworking sector, data on annual sales is one of the most difficult figures to gather. For the present study, the figures provided by the respondents, mostly coming from the MSMEs, are examined to determine the variation of their annual sales. Figure 10 below illustrates these data.

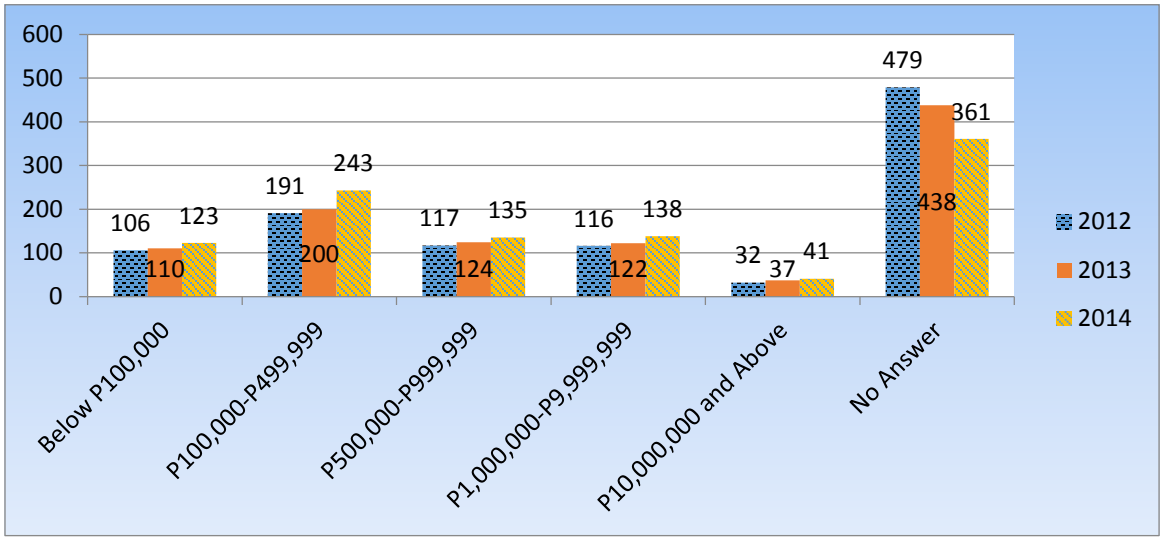


Figure 10. Annual Sales (2012-2014)

Despite the lack of data to properly assess trend in annual sales of the respondents, the figures collected from the survey suggests that annual sales for the local welding fabrication industry is mostly in the range of P100,000 to P499,999 for the period 2012 to 2014.

In general, total welding-related expenditures may include raw materials, capital purchases, consumables, labor, utilities, and other overhead costs, and purchased services (e.g. inspection and testing services). The cost of production of a shop varies depending on the size of its operation.

Among the 1,041 respondents, 244 or 24% of the respondents reported that the cost of their annual production ranges from P100,000 to P499,999. The responses are reported in Figure 11.

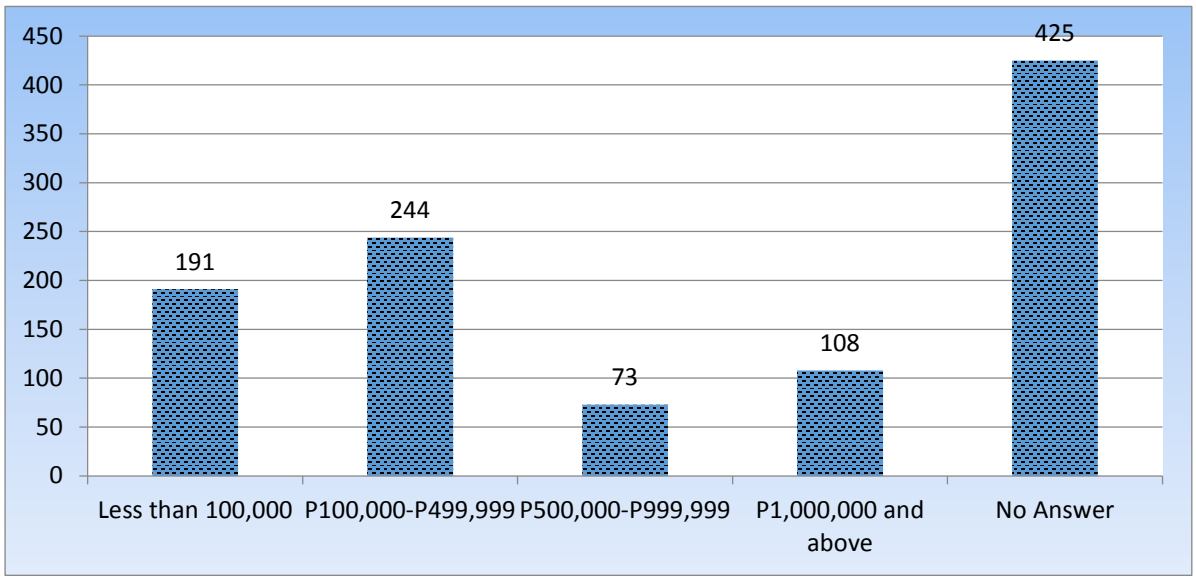


Figure 11. Average Cost of Local Production

The data gathered for this section were mostly obtained from MSMEs in the welding industry. What can easily be noticed from the data is a tendency to have break-even revenue since the advancing market matures rapidly, thus creating challenges to small welding businesses who cannot instantaneously upgrade facilities. The organized market, in this sense, is seen to be controlled by established players in the industry which mostly belong to the large enterprise. Due to the fact that most large-scale welding establishments declined to participate in the survey conducted by the DOST-MIRDC, data on import and export of welding products were used as additional reference for a better understanding of the market activity of the welding fabrication industry.

Sectors Served by the Welding Fabrication Industry

The 1,041 respondents have different products, thus they have different target markets. Figure 12 reveals that the automotive industry is the top-most market that has very high requirements for welding processes. The automotive industry is expected to expand its services in the coming years with the increasing demand for automotive parts and various services.

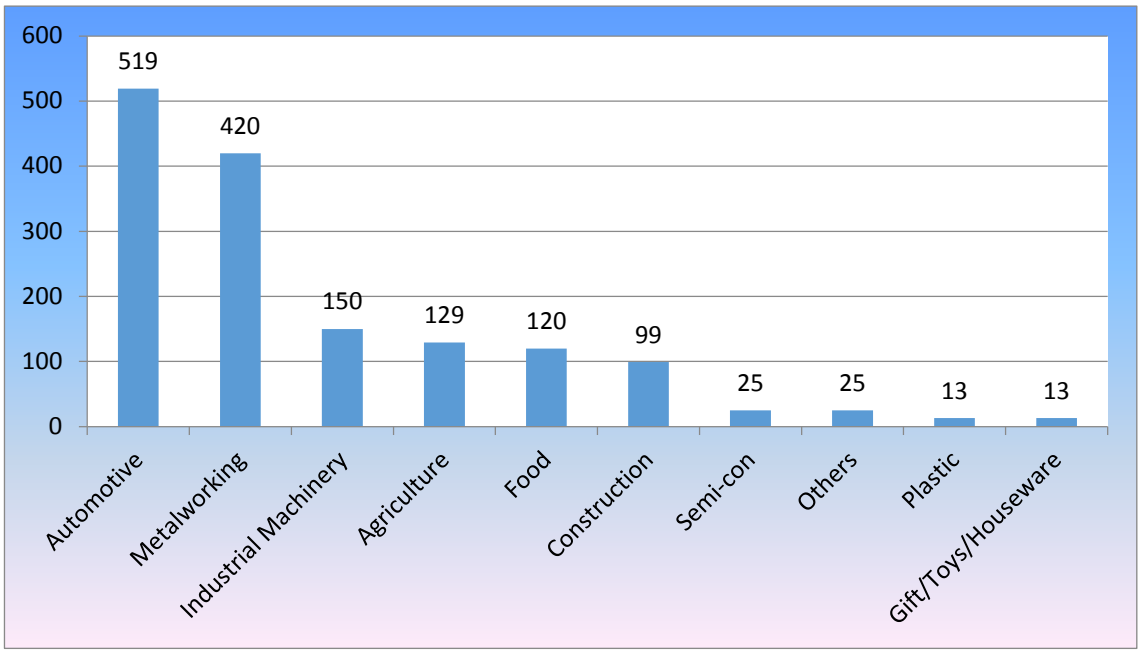


Figure 12. Sectors Served by the Welding Fabrication Industry

A number of welding shops, especially those that belong to the MSMEs found in provinces, are engaged in the fabrication of tricycle sidecars. A bigger market for the automotive industry can still be accommodated in the country. The hurdle in gaining entry is commonly due to the lack of capability to invest large amount of money to cope with the increasing demand for locally manufactured parts and components for the automotive industry. As an example, it was mentioned in the 2014 Investment Priority Plan (IPP) that of the 30,000 parts needed to make a car, there are only 300 parts and components that are locally produced. Addressing the large gap between demand and local supply will greatly benefit the welding fabrication industry and all other industries under the metalworking sector.

Majority of the welding respondents disclosed that their target customers are mostly individuals and not so much of companies. This is because most of the respondents are classified as micro entrepreneurs whose capabilities are limited to some extent and thus, they serve individuals with minimal requirements.

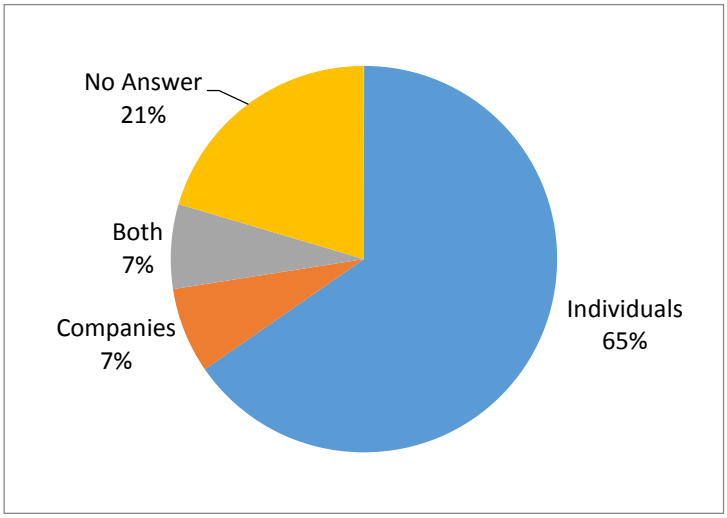


Figure 13. Target Customers

Import / Export

Large welding companies inside the Special Economic Zones in the country are generally into export activities. There are only a few small and medium welding establishments, however, that they are also strategically gaining experience in export activities. By familiarizing with the trend in international trades, these SMEs are able to determine the context of broader scope in demand that can be applied in the domestic market.

A striking change may be noticed on both the export and import data from 2011 to 2015 where the figures rose to more than double in FOB and CIF values. As seen in the data, there is a consistent increase in both FOB and CIF values per annum.

Figures 14 and 15 further illustrate the changes in both FOB and CIF values. There was a gradual increase in FOB value from 2011 to 2013, then a boost in 2014. CIF value on the other hand showed a steady increase from 2011-2015.

Table 4A. Export Data

Export	2011	2012	2013	2014	2015
Gross Weight (Kg)	1,079,821,754	1,511,942,578	938,827,359	1,677,523,547	2,163,654,648.25
FOB Value (Dollars)	1,282,980,085	1,794,963,872	1,869,474,719	2,852,950,896	2,944,913,797.00

Table 4B. Import Data

Import	2011	2012	2013	2014	2015
Gross Weight (Kg)	887,701,409	1,011,511,846	1,128,895,761	1,260,410,100	1,833,655,689.05
CIF Value (Dollars)	4,020,910,646	5,751,658,523	7,367,910,586	7,588,594,140	8,514,711,713.00

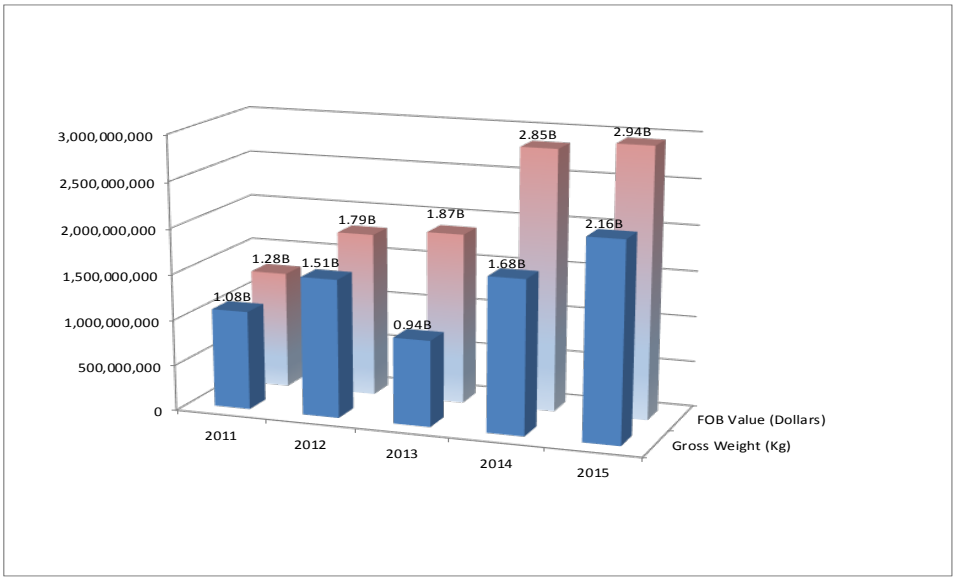


Figure 14. Philippine Export of Welded Products

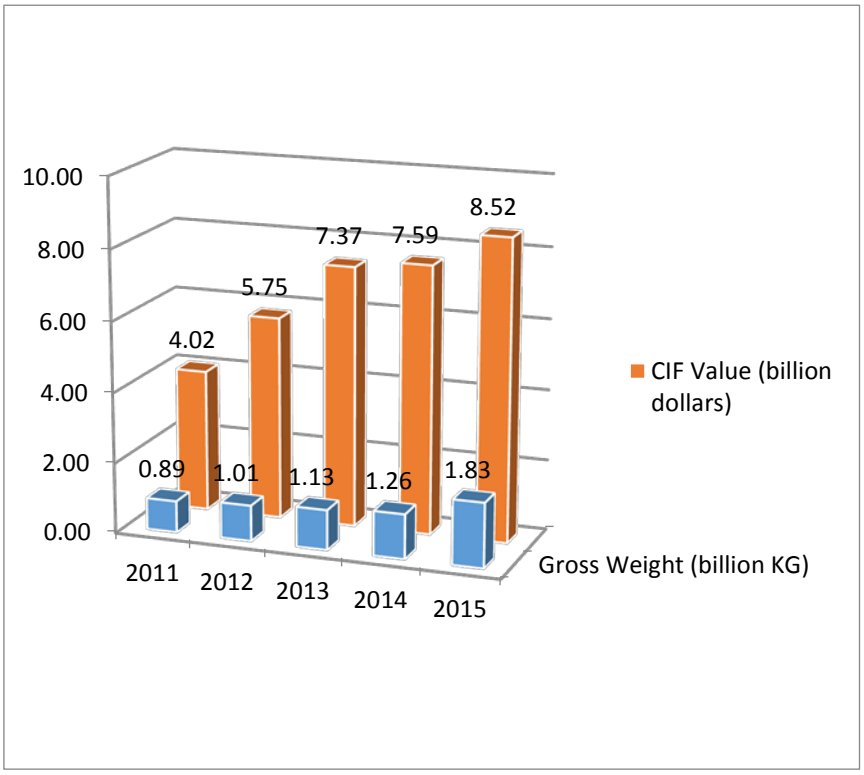


Figure 15. Philippine Import of Welded Products

Top Commodities and Countries for Export and Import

Top commodities exported for the year 2015 are as follows: other vessels for transport of goods and persons, other parts of aeroplanes or helicopters, parts of air conditioning machines, sinks and wash basins of stainless steel, and steering wheels, columns and boxes.

Figure 16 shows the top country destination of the exported welded products. As shown, customers from 2013 to 2015 include Japan, Liberia, United States of America, Marshall Islands, and Hongkong.

On the other hand, imported welded products are purely vehicles of various types: vehicles having not less than 1,500 cc but not exceeding 3,000 cc cylindrical capacity; aeroplanes and other aircraft; motor vehicles not exceeding 5 tonnes; vehicles with cylindrical capacity exceeding 1,000 cc but not more than 1,500 cc and motor vehicles for the transport of 10 or more persons, among others. Suppliers of these commodities are countries such as Thailand, People's Republic of China, Japan, Indonesia, and France.

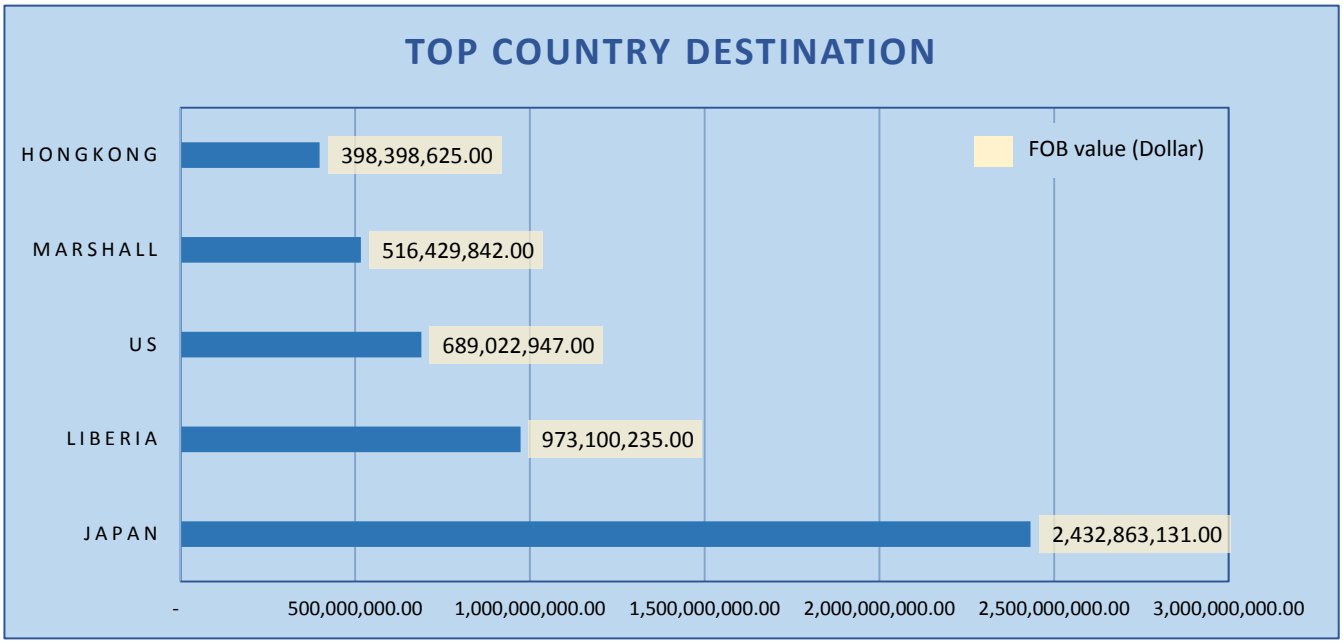


Figure 16. Top Country of Destination of Exported Welded Products for 2013 to 2015.

TECHNICAL PROFILE

This section provides information on the welding equipment and raw materials used in various welding shops across the Philippines. This report, however, excludes other welding items such as welders' gloves and other safety items as the focus of this paper is to assess the technological capability of the industry. Whereas today's production in the manufacturing industry depicts a vastly different trend, particularly demanding an upgrade to more reliable technologies, the need to expand application of welding techniques leads to mechanization and automation to support different fabrication, repair, and manufacturing activities.

Welding is indispensable not only in the manufacturing industry but also in other industries, such as fabrication, repair and maintenance, construction, and energy. Emerging industries in the Philippines, particularly automotive, aerospace, and shipbuilding are significantly applying welding standards to ensure the reliability and cost effectiveness of welded products. A wide range of welding requirements spans to a variety of welding applications, expertise, and equipment. The welding equipment and tools play significant roles in the rapid development of various sectors that employ the welding process. In this paper, different processes, equipment, and tools for welding are mentioned. Below is a brief description of some:

- **Welding Processes and Machines** – The welding process, generally has two classifications: pressure welding, and fusion welding. As defined by Weman (2003), pressure welding is the process of applying sufficient outer force to cause more or less plastic deformation of both the facing surfaces, generally without the addition of filler metal. In some cases, the facing surfaces are heated in order to permit or to facilitate bonding. Fusion welding, on the other hand, is the type of welding without the application of outer force wherein the facing surfaces must be melted and melted filler metal is sometimes added. As the fusion welding appears to be of more practical use, local welders are using equipment that are used for this process. These include arc welding equipment such as Shielded Metal Arc Welding (SMAW), Gas Tungsten Arc Welding (GTAW) / Tungsten Inert Gas (TIG), Gas Metal Arc Welding (GMAW) / Metal Inert Gas (MIG) and Metal Arc Gas (MAG), Submerged Arc Welding (SAW), and Flux Core Arc Welding (FCAW). Oxy-acetylene Welding, which is also one of the most commonly used welding equipment of local welders also falls under fusion welding.

- **Grinding Equipment** – Grinding equipment are used to obtain complete penetration when welding and to correct weld metal sagging. In the process of fabrication, some materials have defects that need to be removed through grinding in order to improve the quality of weld. A grinding equipment is used to avoid excessive current density which may cause metallurgical damage to the surface. Thus, a grinding equipment provides a good distribution of welding current over the electrode contact surface.

- **Cutting Tools and Equipment** – Cutting tools and equipment are typically used in preparing welding parts. As in the case of the welding process, cutting tools and equipment play an important role in the speed and effectiveness of cutting applications. Cutting equipment are classified as thermal cutting equipment, water jet cutting, and thermal gouging. Locally available cutting equipment are mostly thermal cutting (e.g. CNC plasma cutter and CNC router), and thermal gouging equipment.

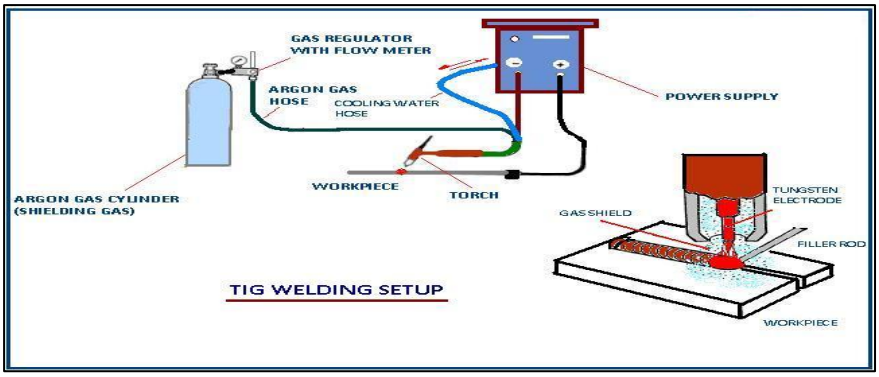


Figure 17A. TIG Welding Set-up
(source: https://www.quora.com/what.is.tungsten.arc.welding)

Figure 17B. Grinding Process
(source: Instructables.com)

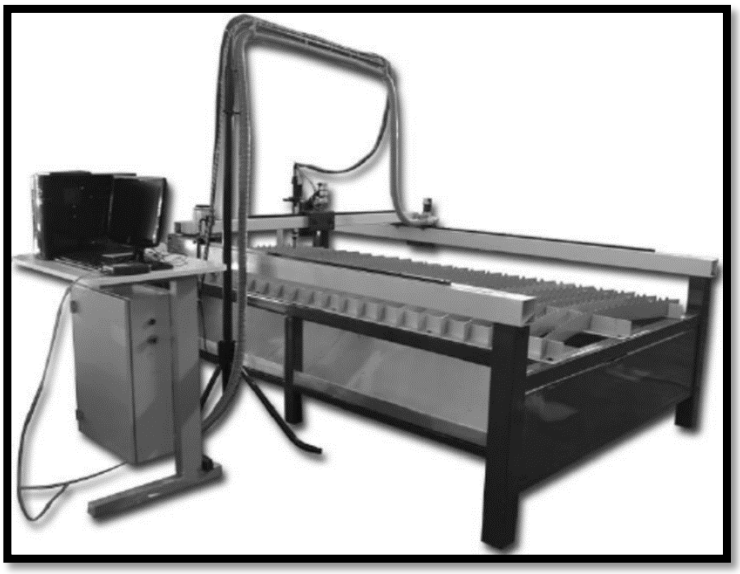


Figure 17C. DOST-MIRDC's Plasma Cutter

Continuous acquisition of welding equipment shows that most industries rely on the welding processes in their business operations due to its economic advantage. Tables 5 and 6 show the welding equipment and other welding-related tools and equipment that are used by local welders.

Table 5. Welding Equipment

Name of Equipment	Quantity	Equipment Status		Mode of Acquisition			
		Working	Non-working	Imported	Locally Purchased	Brand New	Second Hand
Shielded Metal Arc Welding (SMAW)	**8,115**	8,056	59	2,317	5,497	7,134	580
Oxy-acetylene (OAW)	**1,304**	1,290	14	841	130	714	225
Gas Tungsten Arc Welding (GTAW)/ Tungsten Inert Gas (TIG)	**595**	571	24	272	243	455	43
Gas Metal Arc Welding (GMAW) / Metal Inert Gas (MIG), Metal Arc Gas (MAG)	**197**	194	2	146	36	143	18
Submerged Arc Welding (SAW)	**21**	21	0	1	20	12	4
Flux Core Arc Welding (FCAW)	**1**	1	0	0	1	1	0
Automatic (Robotics) Welding	**11**	9	1	8	2	6	-
Others (Spot Welding)	**36**	36	0	18	11	25	-

Table 5 shows that since the industry is composed primarily of micro-enterprises that cannot invest much on sophisticated equipment, the SMAW appears to be the most utilized welding equipment due to its simple requirements. Compared to other welding processes requiring shielding gas which is unsuitable with wind, SMAW can be performed outdoors. The versatility of the SMAW is not the only reason why this equipment is the most popular of all the known welding equipment. Its popularity is also attributed to the simplicity of its operation. SMAW, also known as Manual Metal Arc Welding or Stick Welding, is well suited for heavy metals with a size of 4 millimeters or more, and commonly used for construction, fabrication and repair, and manufacturing. By using the SMAW process, the weld area is protected from oxidation and contamination by the carbon dioxide (CO_2) gas produced during the welding process when a consumable flux-coated electrode is used.

The oxy-acetylene welding's popularity, on the other hand, is due to its various uses in the welding operation, such as in welding and in cutting. An oxy-acetylene kit typically includes torch handle, welding tip with various sizes, a cutting tip, and a heating tip.

GMAW and FCAW, although considered as two different processes, have slight similarities. As discussed by Weman (2003) both processes have the same equipment used for cored wire welding with shielding gas for ordinary MIG/MAG welding. The difference, however, lies on the welding torch, the wire feed unit, and the power source, which all need to be more powerful for the FCAW due to higher current density and thicker wire. The equipment used for FCAW seems a bit complicated to use, making the local welders stick to GMAW.

Submerged Arc Welding (SAW), as shown in Table 5, is not of popular use among local welders. Its use is common in semiautomatic operations and is mostly applied to mechanized welding operations. Its advantage, however, is the substantial savings in terms of low labor cost.

As mentioned earlier, welding is a complex process that is more focused on the welder's skills rather than the equipment used. Although high end welding equipment contributes to the precision of welded products, local welders stick to conventional welding equipment which they used to compete for complex jobs that require technological know-how in order to deal with the customized demands of customers.

Table 6A presents the welding-related tools and equipment, specifically the grinding equipment. As presented, the most common type of grinder found in welding shops is the portable grinder, also called angle grinder. This tool is used to grind welded beams and to create beveled edges for plate or pipe joints. More importantly, portable grinders are used to remove rust and other oxides from the metal surfaces. There are five categories of abrasive discs that are used for portable grinder (welduniverse.com, N.D.) and these are the following:

- Grinding Discs – these are used to get rid of unnecessary materials such as excess weld metal, weld spatter, burrs, and the rough edges of oxy-cut material.
- Cutting Discs – these are used to cut through metal and their characteristic motion may be compared to a mini-circular saw.
- Flap Discs – these are abrasive discs used to polish and smooth metal in preparation for a paint job, powder coating, or bend test.
- Wire Brush Discs – these are used to remove weld spatter and slag from welds without altering the surface of the base or weld metal.
- Sanding Discs – these are abrasive discs that require a special spindle adapter to handle flat rounded sheet of sandpaper.

Table 6A. Welding-related Tools and Equipment (Grinding Equipment)

Name of Equipment	Quantity	Equipment Status		Mode of Acquisition			
		Working	Non-working	Imported	Locally Purchased	Brand New	Second Hand
Portable Grinder	**2,685**	2,647	38	652	1,993	2,136	324
Surface Grinder	**147**	147	0	18	89	73	42
Others (Bench Grinder)	**262**	262	0	21	225	166	62

Bench grinders are also available in most welding shops as these are used to sharpen tools and allow quick removal of rust from small plates before welding. Additionally, bench grinders are used to smooth out bevels cut in metal stock. On the other hand, surface grinders are used for machined parts, hence its availability in some welding shops.

Table 6B presents the most common welding-related tools and equipment. Deciding what cutting equipment to use in the welding operation depends on the degree of customization that is required in the production. As reflected, oxy-acetylene, which is the second most utilized welding equipment, is also a very popular cutting equipment. This equipment typically consists of a portable or stationary oxygen and acetylene and cutting attachment or a cutting torch and applying a greater pressure during cutting. The oxy-acetylene gas cutting process produces dramatic sparks of hot metal showers and is more carefully applied as these sparks may quickly ignite fire. Oxy-acetylene equipment is more common for maintenance work and cutting processes.

Table 6B. Welding-related Tools and Equipment (Cutting Tools and Equipment)

Name of Equipment	Quantity	Equipment Status		Mode of Acquisition			
		Working	Non-working	Imported	Locally Purchased	Brand New	Second Hand
Plasma Cutter (CNC and Manual)	**64**	55	1	9	44	44	8
CNC Router	**2**	2	0	1	1	1	0
Oxy-acetylene (OAW)	**1,304**	1,290	14	841	130	714	225
Arc Gouging	**2**	2	0	1	1	1	0
Bandsaw	**98**	98	0	11	79	69	18
Cut-off Machine	**428**	436	10	393	46	301	79

Aside from the basic welding equipment and tools mentioned above, local welders also own other tools and equipment such as vise grip, chipping hammer, hand drilling machines, buffing and polishing machine, and other hand tools and clamping devices that are common to welding establishments doing fabrication, repair, and manufacturing processes. Since jobbing services are offered by most welders, particularly those from the MSMEs, these welders handle majority of fabrication and repair work. They are known to be skillful as a result of the diversity and versatility of jobbing orders they receive from customers.

Welding Materials

Table 7 lists down the common raw materials used for welding. As indicated, among the materials commonly used for welding are sheet metal, mild steel, tool steel, medium carbon steel, iron, stainless steel, plastics, aluminum, brass, and bronze. Mild steel has the largest utilization in the welding industry for the year 2014.

Table 7. Raw Materials Used for Welding

Raw Materials Used	Volume of Raw Materials (in kgs/year)
Sheet Metal	6,150,798.00
Mild Steel	63,760,189.00
Tool Steel	9,381,969.00
Medium Carbon Steel	5,092,439.00
Iron	747,568.52
Non-ferrous (Stainless steel)	575,528.09
Aluminum	7,652.00
Others (Plastics, Brass, Bronze)	66,072.00

Mild steel is suitable for most fabrication and welding work since it can be welded by means of all the conventional welding process. Its high usage among local welders is also attributed to its reasonable cost and availability. Other raw materials also offer relevant use in the welding process. The unavailability of other materials, as described by most respondents, becomes a problem since the situation directly affects the raw material cost and consequently, the overall revenue of the welding firms.

BUSINESS OUTLOOK

Welding is the process used to join metals to produce certain products. Welding is vital to the creation of metal products in various sectors such as the aerospace; the automotive/transportation sector, particularly in the fabrication of sidecars, repair and fabrication of jeeps and trucks; the agriculture sector, such as in the making of farm implements like hand tractors, threshers, rice mill, corm mill, rice dryers, etc.; industrial sector involving iron works like window grills, trusses, steel gates, swing doors, accordion doors, steel window frames, furniture frames, and stainless steel railings; production of household appliances such as kitchen zinc, kitchen hood, restaurant table, burger fryer, and other stainless steel cookwares; and almost all other industrial equipment.

When asked how they performed in the previous year (January 1 – December 31, 2014), majority of the survey respondents (53%) reported that business is good. In 2015, more business owners were optimistic about the business at the time of the survey where 56% expressed a positive outlook and believed that business will continue to prosper.

Figure 18 provides data on the business performance (2014) and business outlook (2015) of welding shops. The data indicates how welding shops experienced business in 2014, and how they perceive it for 2015.

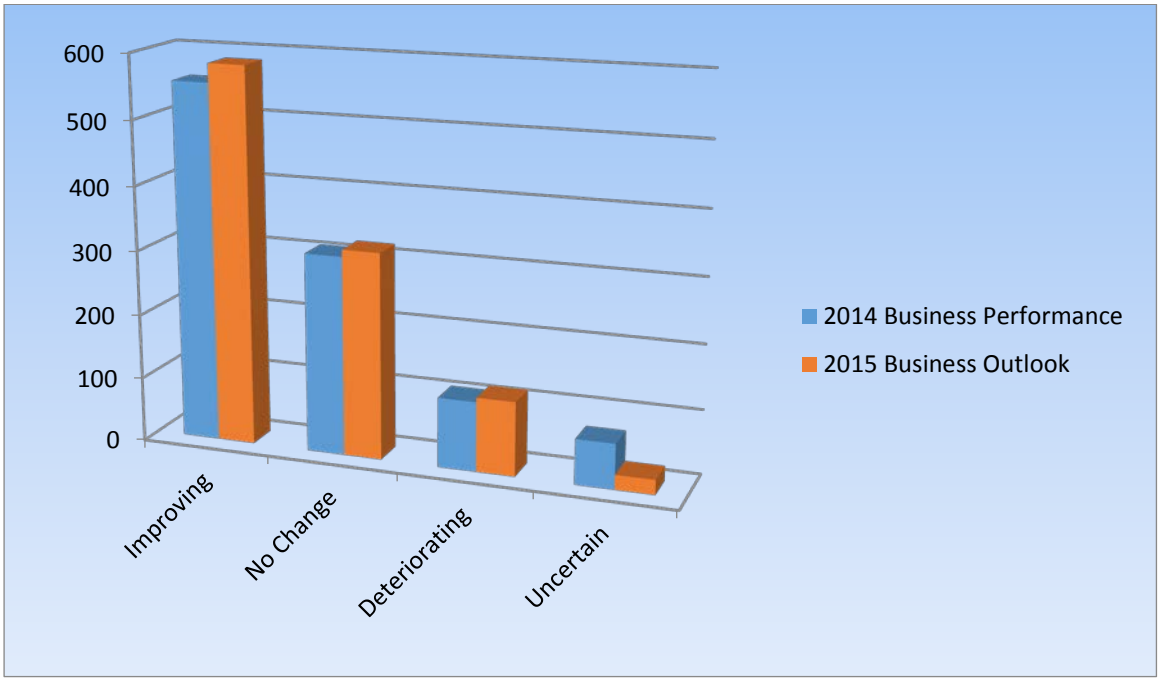


Figure 18. 2014 and 2015 Business Outlook

Strengths/Opportunities

Craftsmanship, customer, durable products, delivery time, human resource, and accuracy of machines play a vital role to a company's success. They are the major factors that make businesses operate smoothly. Survey results disclosed that 67% of the respondents view craftsmanship as the number one factor that makes a welding shop strong (see Figure 19). Craftsmanship is defined as the good quality of work, the passion, and the required effort for accurate delivery. It also refers to the hard-work, patience, persistence, and commitment of employees to come up with products that will surely be appreciated by the end-user. Coming in second in the list of strengths/opportunities is

the customer, according to 63% of respondents. Maintaining customers in the business is not easy. The business must have good standing in terms of service and product quality, durability, right delivery time, and good business relationship. Moreover, the company needs to hire the right kind of people: task-oriented, highly-skilled, with good human relationship, good attitude towards works, and other traits that can contribute to the success of the business. Thus, attending trainings/seminars is not only for skills enhancement or development, but most importantly for values improvement so that employees are able to contribute to customer base maintenance.

The business or organization has to adapt to the constantly changing environment. A company has to know its workforce's motivational drivers and their propensity to embrace change so that it stands a greater chance for success. The staff and key people are important in effectively serving the needs of customers.

The organization must understand and respond to the values and needs of its stakeholders. It is a must, therefore, that staff's attitudes and values must be in aligned with those of the organization's core values.

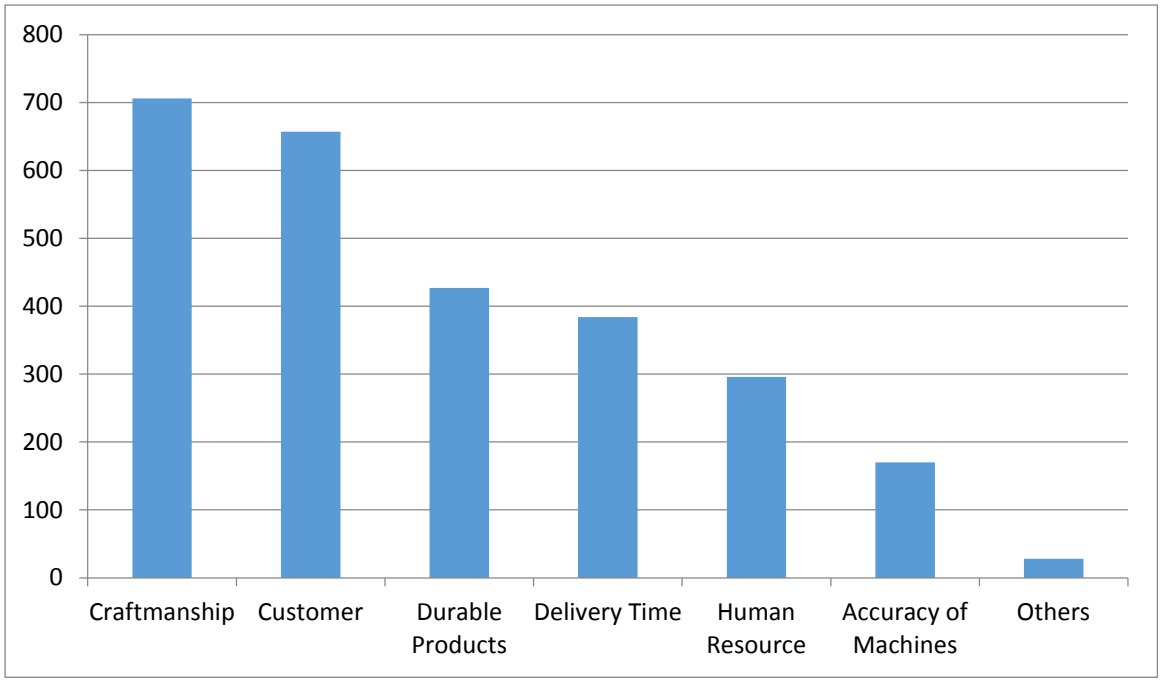


Figure 19. Strengths and Opportunities of the Welding Fabrication Industry

Weakness/Threats

There is no such thing as perfect business establishment. Once in a while, the company encounters some setbacks and shortcomings, which then become weaknesses or threats to the company. Survey results reveal that the most common weaknesses of and threats to welding shops are stiff competition and lack of customers as presented in Figure 20. For welding shops, especially those that fabricate and weld agro-equipment or farm-implements, business is seasonal. The period from June to October is the lean season where job prospects are scarce. On the other hand, the months of January, February, and November to December are peak seasons where there are abundant job orders. Stiff competition belongs the top of the list of weaknesses and threats as reported by 42% of the respondents. This may be addressed by shop owners by encouraging and motivating their staff to attend seminars and trainings in orders to upgrade their skills in new methods and techniques in welding and fabrication.

Other weaknesses or threats identified by the respondents were: (1) no advertisement/marketing strategy to promote certain products; (2) no standard pricing and security; (3) high labor cost, high consumption of electricity and water; and (4) high cost of rentals

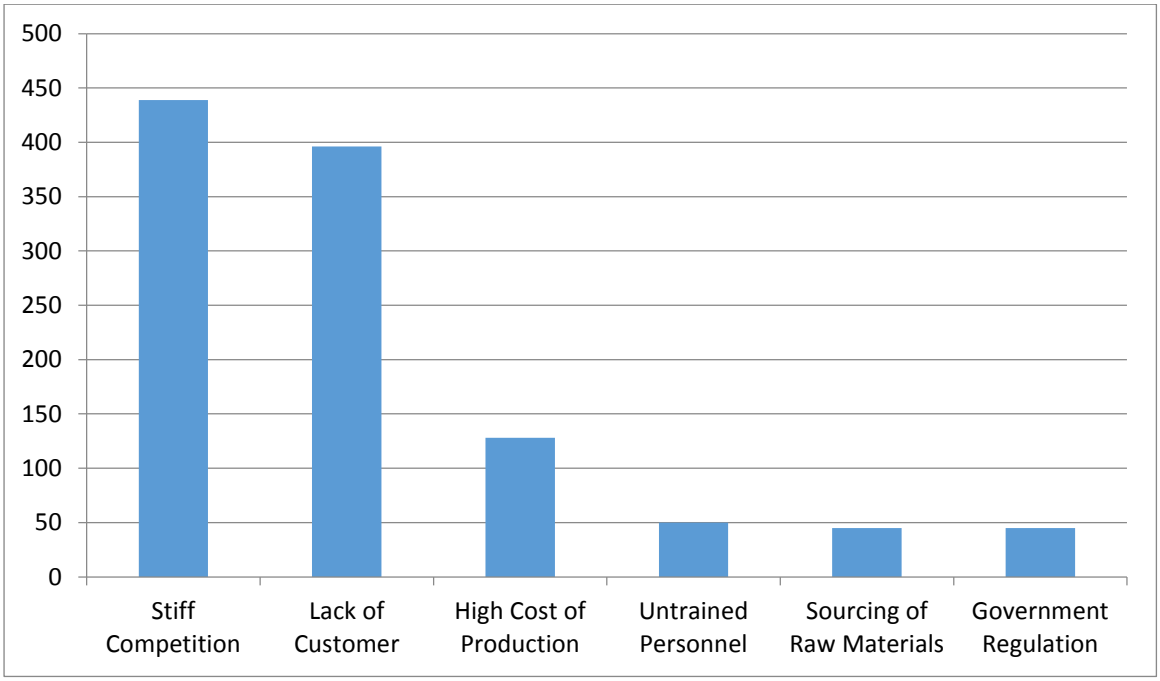


Figure 20. Weaknesses / Threats to the Business (Multiple Response)

Production Problems

The 2015 industry survey for welding shops highlighted the common concerns shared by most welding shop owners: to keep struggling to be more successful; to make the next quarterly earning sufficient; to keep their job going smoothly; to increase earnings; and to compete effectively to meet market requirements. Likewise, the survey reveals the major constraints and difficulties of the industry:

- Materials – Customers complain about undersized and corroded materials, and those with substandard quality. Substandard/undersized and corroded materials as well as rising cost aggravates this problem on raw materials. Some respondents said that they are obliged to travel as far as Metro Manila and Pangasinan to source out raw materials which entails additional costs and results to wastage of precious man-hours. The respondents suggested that a monitoring system be established which will serve to make raw materials sourcing more convenient and provide companies updates on current prices. Some of them are recommending that all materials and products must be regulated by the Philippine government to minimize competition, most particularly low-priced products and materials that originate from China.

- Shortage of Skilled Workers - Welders must be trained in all fields of welding operations so as to be provided with the necessary skills for gainful production, to meet increasing market demands, and to continually replace those who are retiring in the service.

- Fast Employee Turnover / Employee's Negative Work Attitude - Shop owners are also facing challenges concerning fast employee turn-over: some employees use the welding shop as

stepping stone and training ground to enter new jobs or open a line of business; while others seek employment in other countries for greener pasture. Offering competitive salaries and granting incentives may discourage employees from transfering to other companies, and may also encourage and motivate the employees to develop better attitude towards work, and reduce absenteeism.

- Insufficient Supply of Electricity - Fluctuating supply of power is a big factor that hampers the productivity of welding companies particularly in Region IV. For instance, shops are forced to close and stop operation most of the time in some parts of Batangas. These areas get supply of electricity from the Batangas Electric Cooperative (BATELEC), and the power is not enough. In Region IV-B, particularly in Mindoro Occidental and Romblon, brown-outs occur frequently. Shop owners emphasized that these power interruptions result to delays in production resulting to low productivity.

- Equipment Maintenance – Adequate and well-maintained equipment are the heart of the production system. Wear and tear of equipment in the shop affects not only productivity, but also the quality of products. Proper and well-planned maintenance is a measure to ensure that all equipment in the shop floor are operating at optimum efficiency at all times. Respondents revealed in the survey that equipment used in the shops were mostly surplus and outmoded, thus equipment utilization is not maximized due to unforeseen machine breakdown. Nevertheless, maintenance of equipment is necessary to sustain the provision of quality products and services.

Non-Production Issues

- Limited Capital - A business has to have sufficient working capital because inadequate capital will result to budgetary problems that will lead to other related problems, such as failure to pay suppliers on time, reduced income, and stunted business. The survey reveals that majority of the respondent companies had insufficient capital to run the business. Working capital measures the efficiency and financial standing of the company, hence, it is necessary for a small business to have sufficient working capital to operate successfully. Lack of capital impedes a company from acquiring necessary equipment and other expansion needs. Limited capital slows down the company's growth and adversely affects its competitiveness.

- Weak Marketing Strategies - The existing weak market is one of the reasons why some of the shop owners are not definite if they will push through or continue their business. Effective and strategic planning requires that companies conduct market research to know the market's current and future demands in terms of products and services, to determine the appropriate capacity and capability of the company, and establish the company's competitive advantage. Most of the companies have no marketing arm to promote their products and services. In the survey conducted, the owners who plan to expand the business in some areas of production are affected due to limited knowledge of the market. Some of these shops are categorized under jobbing type of business wherein jobs such as fabrication and repair of equipment for agro-business, food equipment, and other industrial machinery are highly seasonal. The shop owners claimed that there is a stiff price competition. Unlicensed welders are roaming around just to get jobs even at a lower salary.

Expectation/Future Actions of the Establishment

A number of shop owners are optimistic about 2015 in spite of all weaknesses, threats, and various problems. Several shop owners are expecting beyond what they have previously experienced. Their optimism leads them to believe that there will be an increase in business activity, average selling price, and the number of people employed. In the same manner, there are some respondents who are unable to predict future status for the reason that businesses always depend on the country's economic and political stability. Table 8 presents the respondents' business expectations for 2015.

Table 8. Current and Future/Business Expectation of Respondents

	Business Indicators							
	2015				**2016 and beyond**			
	Increasing	***No change***	***Decreasing***	***Depends***	***Increasing***	***No change***	***Decreasing***	***Depends***
Volume of business	690	121	54	176	604	141	46	250
Business conditions	530	119	39	353	550	83	30	378
Average selling price	449	194	34	364	508	121	28	384
Number of people employed	441	168	28	404	492	105	30	414

Expansion Plans

Some of the respondents intend to expand the horizon of their welding business. Some welding owners are planning to enlarge their business and to put up additional branches in other areas where the local market is fast growing. The identified places are in the areas of Cavite, Laguna, Tayabas, Cebu, Nueva Viscaya, San Fernando, and Baguio. Other expansion plans include increasing of product lines and services, putting up a hardware shop, increasing products in aluminum works and glass supply, offering supply of car batteries, developing more products, and improving quality to sustain production.

The stability and growth of the business is very important. Various respondents are planning to increase the capacity of the shop by acquiring some machines for welding and fabrication. The top priority equipment that welding shop owners want to purchase are: TIG/MIG Welding Machine, Shaper Machine, Lathe Machine, Milling Machine, Arc Welding Machine, Boring Machine, and equipment for finishing of stainless steel works. Others are planning to upgrade the existing capacity and capability of the shop from manual to computerized machines. Some of the high-end machines they would like to procure are: 5-Axis Computer Numerical Control (CNC), Numerical Control Machines (NC), CNC Wire Cut Machine, Laser Cutter Machine, Electric Discharge Machine (EDM), CNC Water Jet Machine, and CNC Plasma Cutter. Other shop owners are interested in the DOST's Small Enterprises Technology Upgrading Program (SETUP) that is a nationwide strategy to encourage and assist MSMEs in adopting technological innovations to enhance operational efficiency and boost productivity and competitiveness.

Tables 9A and 9B shows the business and future plans of surveyed welding shops in terms of expansion. As shown, majority of respondents do not have plans to expand business in general. Some are still optimistic that they can utilize the additional income to defray the cost of rentals, water and electric bills, telephone bills, and payment of salaries and wages of employees. Some businesses intend to keep abreast of technology updates in order to meet customers' daily requirements.

Table 9A. Business Plans for 2015

Expansion Plan	With plan to expand	No plan to expand	Depends on economic/political situation
Set up additional branch	140	697	204
Increase product lines and services	167	653	221
Increase technical capacity (e.g. purchase equipment)	213	601	227

Table 9B. Future Plans 2016 - 2019

Expansion Plan	With plan to expand	No plan to expand	Depends on economic/political situation
Set up additional branch	137	599	305
Increase product lines and services	162	566	313
Increase technical capacity (e.g. purchase equipment)	203	514	324

GOVERNMENT AND PRIVATE SECTOR INITIATIVES

1. The **Metals Industry Research and Development Center**, is an agency of the **Department of Science and Technology** that directly supports the metals, engineering, and allied industries to enhance its competitive advantage through the provision of professional management and technical expertise on the training of engineers and technicians; information exchange; quality control and testing; research and development; technology transfer; and business economics advisory services.

2. The **Department of Science and Technology (DOST)** launched the **Small Enterprises Technology Upgrading Program (SETUP)** in response to the then President Arroyo's call for more focused assistance programs for MSMEs. SETUP is a nationwide strategy to encourage and assist MSMEs in adopting technological innovations to enhance operational efficiency and boost productivity and competitiveness. The program aims to empower firms to address technical problems through technology transfer and technological interventions. Such technology-based solutions are expected to improve productivity through superior product quality, human resources development, cost minimization and waste management, and other operation related activities. Industry sectors that may avail of the SETUP include: metals and engineering; food processing; furniture; gift, toys, housewares; handicrafts, natural fibers/ and dyes; marine and aquatic resources; and horticulture (Cut Flowers, Fruits and High Value Crops).

3. The **Technical Education and Skills Development Authority (TESDA)** is the government agency tasked to manage and supervise technical education and skills development in the Philippines. It was created by virtue of Republic Act 7796, otherwise known as the "Technical Education and Skills Development Act of 1994." The said Act integrated the functions of the former National Manpower and Youth Council (NMYC), the Bureau of Technical-Vocational Education of the Department of Education, Culture and Sports (BTVE-DECS) and the Office of Apprenticeship of the Department of Labor and Employment (DOLE).

One of the programs of TESDA is the Technical-Vocational Education and Training (TVET). It is the education or training process that involves, in addition to general education, the study of technologies and related sciences and acquisition of practical skills relating to occupations in various sectors of economic life and social life, comprises formal (organized programs as part of the school system) and non-formal (organized classes outside the school system) approaches[3].

4. The **Philippine Economic Zone Authority (PEZA),** attached to the Department of Trade and Industry, is the government agency tasked to promote investments, extend assistance, register, grant incentives to and facilitate the business operations of investors in export-oriented manufacturing and service facilities inside selected areas throughout the country proclaimed by the President of the Philippines as PEZA Special Economic Zones.

It oversees and administers incentives to developers/operators of and locators in world-class, ready-to-occupy, environment-friendly, secured and competitively priced Special Economic Zones[4].

5. The **Philippine Welding Society (PWS)** is an association of various professionals whose aim is to advance the science and professionalize the practice of welding in the country. Their main objectives are: (1) to promote the advancement of the science and practice of welding and to advise and support government entities whenever possible on matters of standardization, public safety and health; (2) to foster and maintain among members' high ideals of integrity, learning, professional

[3] www.tesda.gov.ph
[4] www.peza.gov.ph

competence, public service; (3) to provide a forum for meeting, exchanging of ideas and opinions, and to be involved in the solution of multifarious problems affecting the country in general and welding profession; (4) to conduct workshops and seminars for the purpose of keeping its members abreast of progress in the welding field; (5) to promote orderliness and effectiveness in the maintenance of good fellowship and occupational standards; and (6) and to promote and organize research in all matters[5].

6. **Dualtech Center**, a project of **Dualtech Training Center Foundation, Inc. (DTCFI)**, is a not-for-profit technical-vocational school preparing young people for employment in industrial firms. Through the Dual Training System, the school collaborates with several business entities to impart relevant skills and values to high school graduates. Dualtech Center is committed to contribute to the common good by developing people through the Dual Training System to become trained, skilled, productive, enlightened, and morally upright persons fulfilling the needs of the industry and the communities we serve[6].

7. **Meralco Foundation, Inc.** - From being an investment holding company in 1973, MFI evolved into its true purpose as a fully operating educational foundation that provides funding and vocational-technical education to Filipinos. The foundation implements this mission with its operating arm, the MFI Technological Institute (formerly referred as the Meralco Foundation Institute), through its flagship programs: the Industrial Technician Program (ITP), a post-secondary, non-degree course; and the MFI Training, Technical Short Courses, Agricultural/Agri-preneurship Programs, and Human Resource Development Programs[7].

[5] pws.org.ph/pws
[6] En.wikipilipinas.org
[7] mfi.org.ph

DISCUSSION

The pulse of welding trend in the Philippines still beats strongly for traditional welding techniques due to the fact that small welding businesses in the country are finding it hard to grasp the costly means of upgrading facilities to accommodate the promising future of the industry. However, the growth outlook that is projected on specialized areas as listed in the 2014 IPP is in the need for a more reliable welding solution like automation. The immense need for precision in welding new metals that will be needed by sophisticated industries is leading to a dilemma not only on sourcing of raw materials and supplies but also possible shortage of welders with advanced skills in welding automation.

At present, resource-seeking activities are dominant as the development in the investment environment intensifies through the rise of regional production networks. The developing industries become largely dependent on the quality of services and fabricated materials supplied by the welding fabrication industry. For instance, the aerospace industry in the country is growing and is in need of materials that will adhere to specifications that require lighter materials. Welding process, in this sense, is not only defined as a simple process of joining metals but rather an extensive and critical process used in the fabrication process. As described by Kachhoriya et.al (2012), modern welding process can also be observed in demand structures of other industries such as automobiles, ships, electronic equipment, machinery, and home applications, etc. and can be an effective alternative of casting or as a replacement of riveted or bolted joints.

The preferred areas of investment that may impact the development of welding fabrication industry, as mentioned in the 2014 IPP, include: the manufacturing industry particularly motor vehicle and motor vehicle parts and components, shipbuilding including parts and components, and aerospace parts and components. Where the welding fabrication industry is concerned, the spur of development will be closely linked to the growth in automotive industry that will uplift the skills base of welders and fitters; the aerospace industry that will carry metalworking industry as it gains momentum in generating more economic activities in the manufacturing industry; and the shipbuilding industry that will benefit both the welding workforce and welding activities through investments in shipbuilding facilities.

The local auto parts industry aims to strengthen the country's position as a regional hub for vehicles and parts in Asia which may lead to enhancing value added and local capabilities in the automotive parts industry through improvement of processes, technology, and human capital. Full integration of the automotive industry with the region's production networks that is targeted from 2016-2020 may pave the way to huge volume of production activities envisioned to result to the welding industry's technological shifts as part of the achievement of the auto parts industry's goal is also dependent on the process of fabricating and joining metal parts.

Considering the trend for sub-sectors catered to by the welding fabrication industry, the rising demand for manufactured products may be addressed through mass production. As discussed by Kah and Martikainen (2012), welding automation is the suited solution for making mass production possible and can be made more effective by applying Finite Element Analysis (FEA) simulations. Using FEA simulations will benefit designers and companies in evaluating parameters prior to the physical test set up of welding simulation.

CONCLUSION

The local welding fabrication industry needs to realize that the application of the welding process is currently going beyond its traditional use as it is now applied to more advanced industries. Stronger opportunities are tied to the growing demands of innovative products using new materials, designs, and welding processes. Different sub-sectors that depend on welding techniques hold great promise of incorporating high quality-welded products to large production activities.

A summary of the findings are provided below:

1. The local welding fabrication industry continuously grows as depicted by the increasing number of welding businesses. A large portion of the welding industry belongs to microenterprises, providing jobbing and repair services to individual customers. Despite the preeminence of microenterprises in the industry, employment generation and huge volume of welding operations are attributed to the large-scale welding firms.

2. The automotive and metalworking industries are two of the most served sub-sectors by the welding fabrication industry.

3. Fusion welding, particularly shielded metal arc fusion welding, oxy-acetylene welding, and tungsten inert gas fusion welding, maintains top position in the list of welding processes employed in the various industries. Robotics and automation, despite the fast increasing demand of precision in welding, still struggle to carve a niche in the Philippines due to its cost associated with acquiring the technologies.

4. Most welding firms are optimistic about the future of the welding fabrication industry in the Philippines as an improving business environment was observed by the respondents in the last two years (2014 and 2015). Moreover, the survey participants' business expectation including volume of business activity, business conditions, average selling price, and number of people employed are heading toward an improving status.

The welding fabrication industry in the Philippines is serving sectors that may be considered ripe for innovation but are still underserved due to insufficient capability in terms of local welding technology. In some cases, welding firms that belong to MSMEs are aware of the ongoing trends in the welding fabrication industry but find it difficult to upgrade and modernize their conventional welding resources.

The discussions provided in this report are somehow limited and more inclined to data provided by the MSMEs. Despite a number of large-scale welding firms that declined to be part of the survey, the information imparted by the welding MSMEs clearly describes the kind of development needed to address the challenges faced by the industry. It is significant also to identify the developments that are already managed by large-scale welding firms.

RECOMMENDATIONS

The DOST-MIRDC, through the Technology Diffusion Division, conducted a focus group discussion (FGD) on October 19, 2017 that validated the results of this welding survey. The FGD also served as an avenue for the DOST-MIRDC to solicit relevant insights of industry players and government through exchange of opinions and ideas. Below are the most notable points raised in the FGD:

1. Membership in relevant industry associations

Welding firms are highly encouraged to seek membership in welding and welding-related industry associations such as the Philippine Welding Society (PWS) and the Metalworking Industries Association of the Philippines (MIAP) not only to expand their network that will allow them to promote their products and services, but also to deepen engagement in consultancy activities for a more efficient business outlook. In addition, the welding companies gain more learning opportunities from industry experts through regular conduct of technical forums when they join industry associations.

2. Micro enterprise-focused government assistance

Since the industry is dominated by micro enterprises, a comprehensive policy framework that will assist them in their transition to become small or medium enterprises needs to be put in place. This strategy, aimed at enhancing skills and providing assistance in terms of technology upgrading, will not only foster the expansion of the industry's capabilities to meet the needs of the manufacturing and metalworking sectors, but will align the services provided by welding businesses with the present and future demands of the various other industries they serve.

3. Establishment of a job-sharing system

There are many welding companies competing to serve the automotive and metalworking sectors in spite of the large unserved market in other sectors, as seen in the results of this study (refer to Figure 12). Welding companies categorized as micro and small enterprises are hindered by issues such as costing, reliability, technical capability, lack of working capital, and lack of skills from penetrating the market from other sectors. Also, majority of the small companies are concerned

about the lack of management skills and the use of obsolete equipment. Hence, they cannot compete for government projects. These companies are seriously in need of technology and skills upgrading to be more competitive. A strategy that may address this concern is the grouping or clustering of companies wherein job-sharing will be given importance. Companies in this job-sharing system complement each other such that quick collaboration and expertise in specific areas or specialization are needed; meeting and delivering the complete requirements of the customer.

The job-sharing system will be an effective way of allowing several companies to benefit or gain profit in each project approved in a particular sector. With a job-sharing system put in place, welding companies will be able to penetrate markets from the industrial machinery, agriculture, food, and construction, among other sectors.

4. Continual building of competitive advantage of large-scale enterprises

It is crucial for large-scale welding enterprises to examine the nature of technical advancement practiced by their respective companies. As discussed in the previous sections, the vigor or the welding industry, particularly that which involves export activities, is carried out mostly by welding firms that belong to the large enterprises. They need to map out their business activities to support the needs of their client sectors which are strongly dependent on high quality welded products.

Incentives, if provided to the large enterprises, may urge them to leverage developments which ultimately may reveal the industry's further contributions that are yet to be discovered. Likewise, granting of incentives will motivate these large-scale enterprises to further expand and eventually accommodate more businesses and hire more personnel. As a result, welding firms will have a firmer grasp of the boom of upcoming activities of the manufacturing sector.

5. Strengthening of the DOST-MIRDC's partnership with public and private organizations

Productive efforts to improve the welding industry include widening the reach of the DOST-MIRDC's welding-related initiatives and fortifying collaborations with significant institutions like the TESDA, PWS and the MIAP. This strategy will entail the involvement of key personnel from different institutions working hand-in-hand with one another.

6. Setting up of a Welding Training Center

Through the Welding Training Center, additional equipment such as heavy-duty inverter, SMAW-GTAW welding machine, GMAW, TIG, MIG, MAG, and flux-core arc welding (FCAW) will be acquired. Also, with the establishment of the Welding Training Center, thermit, plastic, and plasma welding processes can be exploited. Ultimately, this initiative will translate to the provision of equipment, continuous creation of a steady pool of skilled trainers, and distribution of updated training syllabus, to name a few. All this benefits will collectively redound to the advancement of technological and business landscapes that is anchored on the building of capabilities and enhancement of productivity of the welding industry.

7. Compliance to international quality standards

Being more knowledgeable on the types of welding defects and how these can be avoided may further lead to reduction, or even elimination, of costly errors in production. Aside from being a cost-effective practice, avoidance of welding defects will ensure that the industry is able to fulfill relevant requirements spelled out by international quality standards. This way, products of the local welding industry can compete more effectively in the global market.

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APPENDICES

Appendix A
List of Respondents

NCR

1. BJ Machine Shop
2. A. Eumage Enterprises
3. JM Glass and Aluminum Fabricator
4. SDK Iron Works
5. JTBR Glass Aluminum & Steel Fabricator
6. A. Bautista Glass Aluminum
7. RRD Bautista Iron Works
8. Angustia Glass & Aluminum Enterprise
9. Carmeliza Steel Fabricator
10. Richjay Glass and Aluminum Supply
11. Hapheng Engineering & Machine Shop
12. Modifier Iron Works
13. AGCCM Trading
14. Lucky Brothers Fabrications
15. Red One Metal Builders Co.
16. IA Trading
17. AMT Metal Services
18. Taal Metal Trading
19. RA Manlulu Stainless Steel Trading
20. Quido Trading & Fabrication
21. RBM Glass & Aluminum Steel Works
22. Greycolor Aluminum, Glass and Steel Merchandise
23. MM Machine Shop
24. Lorico's Gen.Merchandise/ AJ7 Builders
25. Galvashutters & Trading Corp.
26. EA Rañola Machine Shop, Inc.
27. Top Glass Aluminum & Glass Center, Steel & Stainless Works
28. Beavers Electro-Mechanical Works
29. Super Speed Metal Fabricators, Inc.
30. AE Valeros Glass, Aluminum & Iron Works
31. AJ Machine Shop
32. Sealand Engineering
33. Agub Trading
34. 3M Metalcraft
35. Prime Fab Stainless Fabrication
36. 562 Fabrication Center
37. Reggie Machine Shop
38. Vill Machine Shop
39. RIDZ Construction
40. Buddah Hands Up Sidecar Assembler
41. Oliva Engineering & Machine Shop
42. Trapero's Metal Signages
43. Gabriel Iron Works
44. Sky Designs Centre, Inc.
45. Santiago & Sons Metal and Services, Inc.
46. Mamerto Pingol Metal Craft
47. Shurfit, Inc.

48. CHV Metal Fabrication
49. La Rota Tool & Die Services, Inc.
50. Rhod Jane Metal Arts Enterprises
51. Dash Engineering and Machine Shop
52. Navales Machine Shop
53. Acuña Enterprises
54. C4JS Machinery & Engineering Works
55. Dijon Machine Shop
56. G.D. Automotive Shop
57. Ariel Welding Shop
58. Amber Machine Shop
59. Makati Foundry, Inc.
60. VL Advanced Technology, Inc.
61. WITCO Inspection & Testing Corporation
62. Mika and Joyce Glass Aluminum and Iron Works
63. KWIK-WAY Engineering Works
64. Machine Tech Engineering Services Co.
65. Jomar Machine Shop and Engineering Services
66. Cedorada Glass and Aluminum Supplies / Steel Built
67. Mandaluyong and General Services Co.
68. Janus Manufacturing, Inc.
69. Salvino Agri-Industrial Machinery, Inc.
70. Icon Metal Industries
71. BDC Industrial & Allied Corp.
72. BSMM Metal Sheet Fab.
73. Jalmasco Machine Shop
74. Arcenal Machine Engineering
75. Sucat Machine Shop
76. Rey V. Machine Shop
77. Dassa Steel Works
78. HDM Technologies, Inc.
79. A & N Coast & Marble Works
80. GNQ Industrial and Contracting Corporation
81. MLT Wood & Iron Works
82. Rendel Metalcraft
83. Terriniel Scales, Inc.
84. JRAC Iron Works
85. QAMTIS
86. MIDWAY Machine Shop, Welding & Fabrication
87. JMI Welding Shop
88. Arjay Iron Works
89. Celemark Enterprises
90. RTG Sheet Metal Fabrication
91. Nilo Glass, Aluminum & Iron Works Services
92. Joemar Iron Works
93. A.M. Pacleb Enterprises, Inc.
94. ABCOR Industrial Corp.
95. ALPS Machine Shop
96. MAR-LO Aluminum, Glass Etching & Stainless Steel Works
97. RHEN Metal Works and Aluminum, Glass & Stainless Steel
98. Ronald Mufflers and Headers

99. Basquinas Bakery Equipment Services
100. LLC Aluminum Glass Steelworks
101. NBB Glass Aluminum Enterprises
102. G-Metrics Enterprises
103. JYL Stainless Steel Fabrication
104. KFM Steel Fabricator
105. JOPS Industrial & Metal Supplies
106. JNLB Machine Shop Steel Fabrication
107. Albon Metalcraft Corp.
108. MRJR Metal Mfg.
109. Jupas Metal Crafts
110. ECF Metal Products & Repair Services
111. Tria Metalcraft & Engineering
112. J-Ard Steel Works
113. Regemar Metal Craft
114. Fabwerx, Inc.
115. Magirose Trading
116. AJ Builders
117. 5M Steel And Stainless Fabrication
118. Belgado-Luis Steel Fabrication Service
119. Bhay Iron Works
120. Alson Iron Work
121. AMJL Aluminum Glass, Steel Fabrication
122. JED Metal, Aluminum and Glass Services
123. Conie And Rica Welding Shop
124. Roy Cruz Machine Shop's Diesel Calibration Center
125. Ochock Welding Shop
126. Florencio Repair and Welding Shop
127. Cay's Gil Glass and Aluminum
128. Jaw Metal Fabrication
129. Jewels Stainless Fabrication Center, Inc.
130. Peñola Metal Works
131. Chin Seng Metal Fabricatotr
132. FVM Tinsmith Industrial Sales
133. PCS Builders & Machine Works , Inc.
134. JR Gonzales Steel Works
135. Pilfran Machine Shop, Inc.
136. Magee Machine Shop
137. Panadynamics Industrial Co.
138. Dhalia Glass & Metal Works
139. Four S Glass, Aluminum & Steel Fabrication
140. Calanoy Glass, Aluminum & Iron Works
141. Salt & Steel Marine & Industrial Services Corp.
142. Campit CSW Steelworks
143. CRK Glass, Aluminum & Steel Works
144. Gabato Iron Works
145. Baldoza Iron Works
146. Danmer Beros Sash Furniture & Iron Works
147. Emie Boy & Furniture Iron Works
148. OEM Thuyo Corp
149. Megawide Construction Corporation

150. ERM Iron, Glass & Aluminum
151. J4 Aluminum Glass Iron Works
152. Tasper Aluminum & Glass Enterprises
153. Aimse Construction Services
154. A.V. Aguilar Machine Shop
155. GOB Machine Shop & Engine Rebuilder
156. God Is Good Iron Works
157. CEALJ Stainless Steel Metal Fabrication
158. Talipapa Machine Shop
159. NCS Stainless Steel Fabrication
160. GPS Glass, Aluminum, Iron Works
161. Prefix Engineering Stainless Steel Fabrication & Mechanical Works
162. BBC Canasa Machine Shop
163. MABJ Iron Works
164. SLTN Steel Fabricator
165. Chrome Dazzler Corporation
166. Fuerte Steel & Aluminum Works
167. Eagletone Glass, Aluminum & Iron Works Contractor
168. Lito Machine Shop
169. Top Square Glass & Aluminum Supply
170. Spring Builders
171. Welcome Engineering & Machine Shop
172. Arlon's Stainless Steel Fabricator
173. Ruben's Repair and Machine Shop
174. Enrique Welding and Machine Shop
175. ALTECH Builders
176. Villamin Wood & Iron Works
177. Rich Metal Products Corp.
178. Farm Gear Enterprises Corporation
179. Cutting Edge Materials Processing Corp.
180. Makati Development Corporation
181. Far East Semiconductor & Ind'l Toolings Co.
182. Macatdon Brothers
183. Cool Creator Aircon Trading and Services
184. Delio Construction & Fabrication
185. ACMS Engineering, Industrial Works & Machine Shop
186. EB Jacinto Ironworks
187. JEFRA Trading
188. RDM Construction
189. Shawie Metal Crafts
190. NTA Woods & Metal Fabrication Services
191. Gertech Engineering
192. Melstar Enterprises
193. Jeep Center Sales, Inc.
194. Duvan Muffler Shop (West Muffler Shop)
195. Onup Muffler and Body Repair Shop
196. EDISON's Machine Shop
197. Kero Exhaust and Stainless Acc.
198. Dingal Glass Aluminum Fabrication & Iron Works
199. RNL Machine Shop
200. FPQ Enterprises

201. Man Kwok Engineering & Machine Shop
202. Citifab Metalcraft Enterprises
203. MRC Stainless Steel Fabrication
204. Ben 304 Stainless & Iron Works
205. Hongton Metal Design

CAR

1. Loidas Iron Steel
2. Annrey's Iron Works
3. Eli Steel Stainless Steel, Iron, Alum. & Glass
4. AC Shutters Mtr.
5. La Trinidad Iron Works
6. Gal's Iron Works
7. Pok's Iron Works
8. Norso Industrial Services
9. Satty Iron Works
10. Richard's Mufflers and Headers Specialists
11. Leddas Iron Works
12. Xander Iron Works
13. Kibungan Iron Works
14. Rhodes Iron Works
15. LH Iron Works
16. M-Tres SS Accessories , Muffler and SS Products
17. Renser Welding Machine Shop
18. Uni-Bros. Enterprises
19. JJ Iron Works
20. Quimson Iron Works
21. Benguet Blacksmith and Iron Works
22. Pukitan's Iron Works
23. Guerrero's Iron Works
24. J. Cariaga Gears and Al. & Iron Works
25. Alex Villanueva Welding Shop
26. Postino's Iron Works
27. Miguel’s Iron Work
28. Banjo Iron Works
29. CMC Iron Work
30. D. Viloria's Iron Works
31. Iron Works Di Kailihan
32. Baguio City Motors Corp.
33. Joey's Machine Shop
34. Marmenz Iron Works
35. Dolphin Elec. & Mech. Services
36. R&E Machine Shop
37. TCY Machinery Works
38. Adkendor Iron Works
39. ESG Iron Works
40. L and L Iron Works
41. OST Machine Shop and Welding Shop
42. Victorio Stainless Fabrication and Iron Works

REGION I

1. Aces Commercial Machine Shop
2. Benz Sidecar
3. Alvin Side Car
4. Comilenia Sidecar Assembler
5. Gaton Sidecar Builder
6. D.M. Baylon Fabrication Shop
7. Barangay Machine Works
8. Lomboy Iron Works
9. H&M Steel and Glass Works
10. King Mico's Iron Works
11. 6M Agricultural and Industrial Machinery Shop
12. Egbert Radiator Shop
13. Philgerma Mfg., Inc.
14. Pamintuan Machine Shop & Fab.
15. Jimmy Side Car
16. Terrado Machine Shop
17. Tim Lozadas Ironworks
18. Camiling Sidecar
19. Salazar Sidecar
20. Real Madrid & Iron Works
21. Tenorio Tricycle Welding Shop
22. Billymar Ms
23. MDB Metal & Stainless
24. CM Sidecar Fabrication
25. DT Metal Fabrication
26. Dalgems Welding Shop
27. P. PAY Sidecar
28. Jharla Welding Shop (JWS Sidecar)
29. Ram-Pet Iron Works
30. Baketech Food Eqpt. and Stainless Fab.
31. St. Rafael Welding Shop
32. Agcaoili Welding Shop
33. Tesora Welding Shop
34. A.J. Nobleza Motors & General Services
35. DYA Metalcraft (ABC Sidecar Maker)
36. Greg'z Welding and Agri-machine Repair
37. Pidiong Panday Welding Shop
38. Weldingan Ni Ledo
39. Citipoint Metalcraft
40. JohnJet Metalworks
41. Marino MS Conversion & Fabrication
42. Malabed Metalcraft
43. Hercules Welding Shop
44. JSY MS
45. D.U.A. Farm Implements Repair & Assembly Shop
46. Brylle's Tricycle Shop
47. RESSTEEL Construction
48. Jo B. Steel Welding Shop
49. J. Madarang Welding Shop

50. Arzadon Machine Works & Automotive Repair shop
51. Tony Welding Shop
52. Nelson Tricycle Shop
53. 739 Builders
54. 3G & A Tricycle Body Repair Shop
55. Tom'z Tricycle
56. Reyes Metalcraft
57. Amistad Tricycle Shop
58. De Guzman Machine Works
59. New Prestoza Machine Works
60. Mike's Steel Fabrication

REGION II

1. ACT Machineries & Metalcraft
2. Agri-Comp
3. Isabela Machine Shop
4. Turla Welding Shop
5. Jaslyn Welding Shop
6. Melden Welding Shop
7. Northeastern Metalcraft
8. RB Welding Shop
9. Nova Welding Shop
10. Arcega Ironworks
11. Latonio Pandayan
12. E.C. Tire Supply (W/ Welding Shop)
13. Four M Aluminum & Glass, Steel Fabricator
14. Mels Welding Shop
15. FG Stove Fabricator
16. Soneza Welding Shop
17. Nanion Blacksmith Welding Shop
18. ORIX Welding Shop
19. Del Rosario Welding & Machine Shop
20. Z & V Welding and Machine Shop
21. Lago Welding Shop
22. M R Welding Shop
23. Jay Mars Ent.
24. FOUR J Welding Shop (formerly BGS Welding Shop)

REGION III

1. N.T.D.C.Y 888 Global Enterprises
2. Arisan Welding Shop
3. J&A Machine & Engine Rebuilders Engineering Works
4. Eristou Navarrette Welding Shop
5. Fred Machine Shop & Engine Rebuilder
6. G. Talastas Motors
7. EVP Machine Shop
8. Bert Machine Shop
9. Icatech Engineering
10. AE Metal Industry

11. Mike Gino2 Metalcraft & Car Accessories
12. North West
13. C.Talastas Motors
14. Guiguinto Glass Iron Works
15. Gonzales Welding Shop
16. 3M Hollow Block Machine Shop
17. Rojat Hollow Block Machine Maker
18. C. B. Jay Concrete Mixer & Hollow Blocks Machine
19. J.A.M. Glass & Al With Steel Works
20. Danver Sidecar
21. Solis Fabrication
22. R Sacman Concrete Products and Iron Works
23. Anbeth Machine Shop
24. Mendoza Mufflers & Welding Shops
25. BJ Machine Shop & Engine Reconditioning
26. Addona Trading
27. Fulweld Machine Shop
28. LVH Enterprise
29. RR JR Stainless Metal Craft
30. EC Welding Shop
31. Naji Moll Machine Shop
32. 3 Brothers Welding Shop
33. J. Manlapas Welding
34. San Roque Repair Shop
35. A.G. Aquino Welding Shop
36. JD4 Welding Shop
37. 381 Star
38. Rick Ala Iron Works Glass and Aluminum
39. Dandy Welding Shop
40. TAMAYO Machine Shop
41. Escartin Metalcraft
42. Orlan Sidecar Shop
43. Shyron Iron Works
44. Daimaru Machine Shop
45. De Jesus Welding Shop
46. Ombao Machine Shop & Welding Services
47. Nick Welding
48. JC Villanueva Machine Works
49. RAN RAIN RLAS AL AN Iron Works
50. Kioto Stainless Steel and Iron Works
51. 2 M Iron Works
52. Orlan Sidecar
53. FBS Iron Works
54. Marin Side Car
55. Dagsan Welding Shop
56. RS Machine Shop
57. AR & R Welding Shop
58. AV Pizarro Welding
59. R.A Apelo
60. Builders Glass & Aluminum Supply
61. Edzer Welding Shop

62. Jersal Welding Shop
63. Aron's Sidecar Welding Shop
64. Oscar Welding Shop
65. Boni Machine Shop
66. F. Bongon Machine Shop
67. D.B.S. Welding Shop & Tigweld
68. Rassel Machine Shop
69. Davies Machine Shop
70. ASP Machine Works
71. Autocheck Parts And Services
72. Jene Machine Shop
73. Perfect Fabrication
74. FTL Machine Shop
75. OFW MACHINE SHOP
76. Joecel Machine Shop
77. Reynaldo (Rey Side Car)
78. Edgar Sidecar Builder & Welding Shop
79. Bongon Machine & Calibration
80. Alvin Welding Shop
81. JJ Esteban Enterprises
82. Lino's Machine Shop
83. Eric Welding Shop
84. Eumman Machine Shop
85. Eumman Machine Shop & Welding Shop
86. Alexis Machine Shop
87. Samson and Son's Eng'g. Works
88. Valencia Machine Shop
89. Stephen Machine Shop
90. Melgenegel Welding Shop
91. Roan Welding Shop
92. C-4 Sidecar
93. Jewel Side Car and Iron Works
94. Twin C Sidecar
95. Itto Orena Welding Shop
96. Triple M Sidecar
97. MJ Sidecar
98. Joselito Torres Machine Shop & Welding Shop
99. Edmonds Welding Shop
100. M6M Machine Shop
101. Thon Sidecar
102. Angeles Machine & Welding Shop
103. Abar Machine Shop
104. Daves Machine & Welding Fabrication
105. Jed Piggery Equipment
106. Sebastian Machine Shop
107. Hernandez Machine Shop
108. Bals Machine & Welding
109. Associated Machine Works
110. 3D's Metalworks
111. Metalcraft
112. First AJ Sidecar

113. V.I. Tolentino Jr. Machine Shop
114. Bayani's Iron Works
115. CTF Sidecar
116. JC Zapra Welding & Machine Shop
117. Pepito Jose Welding
118. Teloy Sidecar
119. Takegawa Welding Shop
120. Jr Blacksmith Welding Shop
121. Bats Sidecar
122. AJJ Metalcraft
123. Tony Agatep Welding & Machine Shop
124. Somintac Welding
125. L.S Taňedo Machine Shop
126. Arby Sidecar
127. Ver Welding Shop
128. Gloria Machine Shop
129. Boy Sidecar
130. Ding Welding Shop
131. Abel Welding
132. JM Sidecar
133. Jeff Sidecar
134. Jeminez Quiambao Cash Auto Retailing & Side Car
135. Rar Stainless
136. Pacman and Sfanky Sidecar
137. Armando Gomez Sidecar
138. Thoy Welding Shop
139. Mar Welding Shop
140. M.R. Cuchion Welding and Machine Shop
141. Lhoyd Sidecar
142. MBM Metalworks
143. DYPR Stainless Steel Fabrication
144. Meteor Metalcraft Center
145. 3 ZISTERS Stainless Steel
146. ZAR Enterprises
147. Bong Manalang Fab. & Welding Shop
148. New Rodriguez and Sons Eng'g. Works
149. Danny Welding Shop
150. Val 3 Welding Shop
151. Ed Noel Machine Shop
152. CVC Side Car
153. Ian Sidecar Maker
154. JAGL Welding and Repair Shop
155. Danny's Welding Shop

REGION IV-A

1. KEA Industrial Corporation (Philippines)
2. L. Angeles Machineries Corporation
3. Jhay Marr Side Car
4. Española Fabrication & Engine Builder
5. Triple N Steel Engineering Services
6. Hawk Machinery Fab
7. J S Amparados Machine Shop
8. Dante Machine Shop
9. Oblena Enterprises
10. Luisito Sidecar Maker
11. Rising Sun Machine Shop
12. Mirason Machine
13. Dragon Welding Shop
14. John McArthur Enterprises
15. 6 Gear
16. CEGI Enterprises
17. Supersystems Tooling and Metal Fab, Inc
18. Racsotec Enterprises
19. Sanchez Machine Shop
20. Brillo Semicon Plating
21. Riclet Technologies Manufacturing, Inc.
22. RM Machine Shop
23. DCN Welding Shop
24. KLR Stainless Steel Fabrication
25. Malijan Enterprises
26. Molino Sidecar Maker
27. Dudes Iron Works
28. MESDO Builders & Supply
29. Castro Stainless Steel Fabrication Services
30. Wilfredo Bequillo Iron Works
31. Molino Machine Shop
32. Sherey Glass Aluminum & Iron Works
33. Cristal Welding Shop & Steel Fabricator
34. Jaggers Welding Shop
35. Criz & Ivan Welding Shop
36. Amatista Design and Construction
37. Greencakes Builder & Enterprises
38. Leonico Glass Alum. Iron Works
39. Sun and Earth Corp. (Sunmix)
40. G-Thel Welding Shop
41. Roam Builders
42. Tri-R Allied Ind., Inc.
43. ERML Trading & Engineering Services
44. Rovi Auto & Motorcycle Repair Shop
45. Kabayan Sidecar Shop
46. Ruyet Ironworks
47. LVC Sidecar Fabricator
48. NTPI, International
49. JKFS Enterprises

50. Lamigo Welding Shop
51. Industrial Galvanizers Corp.
52. Dodong Welding Shop
53. Maximo Pel Welding Shop
54. Danilo Motor Auto Shop
55. Ariel Auto Shop
56. Triple D Trading
57. EARCIG
58. Jamel Auto Electrical Shop and Welding Services
59. YSA Shutters
60. Paquits Iron Works
61. KY Autowork
62. Gemstar Engineering
63. Alas Cortez Sidecar Maker
64. Jay Ruz MS
65. Rollmaster Machinery Industrial
66. Rockstar MS
67. Palao Machine Shop
68. Sixto Metals and Woodcraft
69. Aguilar Machine Shop
70. Legaspi Glass Aluminum
71. Mholly Machine and Engine Rebuilders
72. RGG Stainless Steel & Metal Fabrication
73. Cantorna Sidecar Maker
74. Grasco Industries Incorporated
75. A.R.B Machine Shop & Engineering Rebuilders
76. Nolie Machine Shop
77. Esperanza Machine Shop
78. A. Umali Enterprises
79. Check Point Machine Shop
80. Iron Lady Designs & Finishing Works
81. Malasaga Trading Corp.
82. Uni Machine Metal Fabrication Corp.
83. United Parens Mfg., Co. (UPMC)
84. Hernandez Eng'g. Works
85. Stamp Form Metalworks, Inc.
86. Berunio Iron Works
87. ABE Machine Shop
88. PPJ Machine Shop
89. Oña's Fabrication & Welding Works
90. BHEZFAB
91. RMS Raffy's Machine Shop
92. Pulo Glass Aluminum & Iron Works
93. Jmar Ind'l Services
94. Vulcanizing & Welding Shop
95. MYR Machine Shop
96. Hi-Tech Machine Shop
97. Blairwin Technology
98. Armak Motors
99. Fredson Machine Shop
100. Suarez Machine Shop & Eng'g. Works

101. Minda Welding Shop
102. ABD Metal Fab.
103. Elesea Kitchen Utensil
104. KFAG Solomon Ss Fabrication
105. D. Zapata Machine Shop
106. Reggie Metal & Ss Craft
107. ADS Welding Shop
108. Bino Tricycle Shop
109. Gilbert Welding Shop
110. Dante Welding Shop
111. Danny Welding Shop
112. Gertudez Stainless Steel Metal Fabrication
113. JRM Machine Shop
114. Bonifacio Fidel Welding Shop
115. Dan Mor Vulcanizing and Welding Shop
116. MC VIN Vulcanizing and Welding Shop
117. Jojo & Mira Metal Craft
118. Mang Boyet Welding Shop
119. Aguilar Welding Shop
120. Arrean Enterprises
121. Willy Welding Shop
122. Cabardo Welding Shop
123. Macalalag Enterprise
124. Jerry Menes Iron Works
125. Ramos Welding Shop
126. Briones Welding Shop
127. D.S.O Enterprises
128. Tino Welding Shop
129. Estrosa Welding Shop
130. Kulot Welding Shop
131. A.U. Welding Shop
132. E.C. Bumalay Welding & Iron Works
133. Ka Mario Welding Shop
134. Cris Builders and Welding Shop
135. Ronaldo Martinez Welding Shop
136. Tope's Welding Shop
137. Warren Machine Shop
138. 3M Welding Repair Shop and Upholstery
139. Valmonte Welding Shop
140. A. Solita Welding and Upholstery
141. Rene's Metalcraft and Repair Shop
142. Saluna Steel Fabrication
143. Optitech Corporation
144. Erlie Fabrication and Machine Shop
145. Airtech Systems Construction
146. A. Cunanan Welding Shop and Co.
147. RAM-J Metalcraft
148. ESJ Precision Tooling
149. Ambrose Ludas Trader, Inc.
150. Mary Check Trading
151. Industrial Design & Equipment Expertise, Inc.

152. SANVIL
153. BIG A Enterprises
154. Princena Machine Shop
155. CDR Garantisado Metalcraft
156. ISB Ironworks
157. Mags Machine Shop & Engg. Works
158. Deuteronomy 8:18 Welding Shop
159. Tabas Muffler Shop
160. Joey Trykes Welding Shop
161. Mariñas Technologies, Inc.
162. JB & MJ Tech'l Services Co.
163. Saynes Glass & Al. Supply
164. Duma Welding Shop
165. Tonyo's Sidecar
166. Rey Windoors
167. Castolome Welding Shop
168. Lantikan Welding Shop
169. Rey-Mark Windows Al & Glass Supply
170. Poying and Sons Welding Shop
171. Bayani Welding Shop
172. Arthur Welding Shop
173. Josefina Quintos
174. RT Penezares
175. Kagiwa Muffler Shop
176. Eliva Welding Shop
177. Elsa Welding Shop
178. Moshi Moshi Side Car
179. Jopaz Fabrication and Steel Windows
180. Metal Trend Enterprises
181. Ariel Saynes Glass Aluminum Supply
182. Jazel and Yeoj Enterprises
183. Enrique Zobel Technical Center
184. Enzotech
185. Gemino Iron Works
186. Jaime B.M Ref. & Airconditioning
187. Moises De Maano WS
188. Rantes Welding Shop
189. Quirico Endaya WS
190. Rotadyne Machine Shop
191. Andrew De Guzman Uy
192. Truck Master and Body Builder
193. Mario Vulcanizing & Welding Shop
194. Calingasan Welding Shop
195. Carlito De Silva Welding Shop
196. Tom's Tricycle Welding Shop
197. Rey Welding Shop
198. RV Metal Works
199. Melvin Welding Shop
200. RF Welding & Body Repair
201. Lorie Welding Shop
202. Burgos Machine Shop

203. San Sebastian Trading
204. ABC Machine Shop
205. Sherwin Maranan Cortez
206. Jolo Sidecar Builder
207. Meer Muffler Shop
208. Ramil Valdera Welding
209. Town Place Iron Works
210. E.M.S Aluminum and Steel Works
211. Joel's Welding and Vulcanizing
212. Lino Martenez Welding Shop
213. J.J. Welding Shop
214. Eleoterio Atienza Welding Shop
215. Alejandro Esteleta Welding Shop
216. NV Platon Machine
217. R and M Glass Al and Iron Works
218. Sweet Apple Sidecar and Repair Shop
219. Jeff Machine Shop
220. Cyrus Welding Shop
221. Jolo Sidecar Builders
222. Almario Motor Parts and Service/Welding Shop
223. Edwin Abejoro Sidecar Motorshop
224. Agogo Ent.
225. Radiator Specialist and Welding Shop
226. Ilagan WS (former Efren Ilagan Welding Shop)
227. N. R. Magpantay WS (former P. Magpantay Welding Shop)
228. Arman WS
229. Great Swiss Metal Builders Co.
230. Rockypeller Riaño WS
231. Cathy WS
232. AG & P Co., Batangas
233. Kambal Motorworks
234. William Motors
235. Ivandior Motorworks
236. Melvin WS
237. Rene Auto Repair Shop
238. Arcega WS
239. 4M WS
240. LZK Machine Shop
241. Smart Welding & Machine Shop
242. Austria Metal Shop
243. Japjap Machine Shop
244. Malijan Motors
245. Randy Motors
246. D.R. Averilla Construction Corporation
247. Remalee Supply & Engineering Works
248. Ona Welding Shop
249. BNE Engineering & Machine Shop
250. RCS Autoshop
251. Mandok Motorcycle Shop & Accessories
252. IRV Tire Supply & Machine Shop
253. JMC Sidecar Maker & Welding Shop

254. Victoria Sidecar Maker
255. BF Sidecar & Welding Shop
256. CTF Engineering & Machineries Services
257. Transman Engine Rebuilders, Inc.
258. C-ZEN Machine Shop
259. Sumulong Enterprise
260. A1 Tool & Die Machine Shop
261. Sancedra Engineering Enterprises
262. M.F Perez Welding Shop
263. Padilla Machine Shop
264. John Ace Industrial Engineering Services
265. CVC Precision Toolings
266. Helen Machine Shop
267. Dazzle Racing
268. Cunanan Automotive & Machine Shop
269. ADS Construction
270. J. Millare Auto Repair Shop
271. Sta. Maria Machine Shop
272. Manuel Ablay Side Car Assembly
273. Roberto Tongohan Welding Shop
274. Florito Diligan Auto Repair Shop
275. Bandoma Sidecar Maker Welding Shop
276. R-Jace Steel Works
277. E. USON Engineering
278. WAT Autoshop
279. F.C.E Motor Services and Welding Shop
280. Next Vulcanizing Shop
281. Catalino Welding Shop
282. P & R Parts and Machineries ,Inc.
283. Landtek Enterprises
284. B. San Felipe Iron Works and Auto Repair Shop
285. Carmela C. Balatibat Ron Ron Sidecar Maker
286. Marlon Mechanical Shop
287. ECXS Machinery and Industrial Services Corp.
288. Alfredo Tevera Ironworks
289. Ago Motorcycle Parts
290. Maritino's Machine Shop
291. CLIF Electric Equipment Trading/FMJ
292. PMS Glass Aluminum & Steel Fabrication
293. JASVI Auto Shop
294. Metal Gear Auto Care Center
295. Jesmir Enterprises
296. Ashercons Enterprises
297. Structural Industrial Sales
298. V.A. Fuentes Glass & Metalcraft Ent.
299. Morales Motor Corp.
300. R & L Enterprises
301. Benchel Jake WS
302. Valle Machine Shop
303. Krishna Machine Shop
304. Mejan Fabrication

305. Obetski Welding Shop
306. Agno Welding Shop
307. J. Manila Glass Supply, Aluminum & Steel Fabrication
308. JMC Metalworks
309. Arje Welding Shop
310. Master Engineeering
311. Red-V Machine Shop
312. M & B Machine Shop
313. Avanzado Machinery Works
314. R.N Boromeo Shop
315. Jabrica Engineering Works
316. Maharlika Machine Shop
317. Cadeliňa Iron Works
318. Garcia Machine Shop
319. Cotta Welding Shop
320. J.C Cariaga Welding Shop
321. Manaoag Hardware & Welding Shop
322. Rommel Welding Shop
323. Leiandro's Welding Shop
324. Vylee Sidecar Auto Repair & Welding Shop
325. Froilan Arellano Welding Shop
326. Gilbert Welding Shop
327. Jojo's Welding Shop
328. Emer's Welding Shop
329. L&G Tricycle Body Builder
330. Alfuerto Welding Shop
331. Extreme Machine Shop
332. E. Zapanta Machine Shop

REGION IV-B

1. Naw-Ruz Welding Shop
2. Edwin Buddys Metal Works
3. Rogelio Garcia Welding Shop
4. DNG Welding Shop
5. Roda Welding Shop
6. MAK-RD Welding Shop
7. GMJ Pulgar Welding Shop
8. EWJ Welding Shop
9. Jose Welding Shop
10. Platty Welding Shop
11. Manuel Villajos Welding Shop
12. JMR Welding Shop
13. I.C. Welding Shop
14. B. Valencia Welding Shop
15. Joseph Avegetero Welding
16. Dormentes Welding Shop
17. Enano Welding Shop
18. Ener Robles Welding Shop
19. Nandz Welding
20. Dela Cruz Auto Shop

21. Gerry's Metal Crafts
22. Arceo's Welding Shop
23. Reizalyn Welding
24. AXL Welding Shop
25. Manuel Manansalang Shop
26. Vahid Welding Shop
27. ED Welding Shop
28. Torrel Commercial & Ind'l. Works
29. Gabute Metalworks
30. Mighty Mileage Eng'g Works and Supply
31. R&V Construction
32. Dadoy Shop
33. SMS Machine Shop & Engine Rebuilding
34. LGM Iron Works
35. Gaan Talyer
36. Gabute Metalcraft
37. New Renwood Construction Supplies and New Management
38. Fajarito Welding Shop
39. Cesar Manzano Ironworks
40. Roy Garcia Welding Shop
41. AJD Swetres Tinsmith & Builders
42. Lañojan Stainless & Iron Works
43. Mortel's Welding Shop
44. Darnel's Iron Works
45. Tamayo Welding Shop
46. NCL Motors
47. EGM Welding Shop
48. Fortunato Motorworks & Repair Shop
49. Poctoy Automotive and Metalworks
50. Amorsolo Fadriquella
51. Jam Iron Works
52. Vic Iron Works
53. Perez Welding Shop
54. Romy Fetalco Shop
55. IRJ Surplus w/ Welding Shop
56. Factor Welding Shop

REGION V

1. Charis Steelworks
2. Ravalo Machine Shop & Auto Supply
3. Romeo Baldo Welding Shop
4. Herrera Auto Repair Shop
5. Maroroy Auto Works
6. Belga's Welding Shop
7. Vargas Machine Shop & Welding Shop
8. Mirabel Welding Shop
9. Joker Welding Shop
10. Lady Boss Auto Repair Shop
11. Calevan Auto Repair Shop
12. Palanca Machine Shop & Co.

13. Windmax Marketing & Aircon Services
14. Tahao Steel Fabricator
15. RNM Auto Body Shop
16. Loria Welding Shop (P.G.L. Welding Shop)
17. Pearl Machine Shop
18. Barrientos Machine Shop
19. Raymond Machine Shop
20. Sude Welding and Repair Shop
21. Alamo Metal Craft
22. Pacific Cordage Corp.
23. Thunderbolt Ironworks
24. ABM Enggineering & Dev't. Services
25. Bañares Metalworks
26. CBF Industry Machining & Engineering Services
27. Bolaños Welding Shop
28. Enteng Glass & Welding Shop
29. A & G Welding Shop
30. Buendia Welding Shop
31. 6D Welding & Machine Shop
32. SN Villa Steel Fab.
33. Borbe's Welding Shop
34. Cathywin Welding Shop
35. Gelyn Motor Repair Shop
36. SBC Machine Shop
37. Arizapa Welding Shop
38. J.Y.Q. Enterprises
39. City Maraog Welding Shop
40. Jurex and Reign Metal Fabrication Shop
41. Nabua Agri Machineries
42. Country Field Welding
43. ECA Agri Machineries
44. Alep Welding Shop
45. Enteng Iron Works
46. Nono Welding Shop (BQA Metalcraft)
47. 13258 Anselmo Machine Shop
48. Champion Machine Shop
49. MAS Steel Fabrication
50. Luzonian Machine Shop
51. AFC Welding Shop
52. Iriga Joe Machine Shop
53. Kolbi Tropics Agro Industries
54. Bicol Agri Machineries
55. Deux Machine Shop
56. Blancada Welding Shop

REGION VI

1. Berpa-Flex Technologies
2. Egger Farm Plating
3. Gascon Pipe Gending & Ss House
4. Lopez Engineering & General Service

5. Jaruda Metal Industries
6. Warlen Ind'l Sales Corporation
7. AU Hand Gunner Gun Repair Shop
8. Alternative Indegenous Development
9. Negros Metal Corporation
10. Edward Metal Industries

REGION VII

1. Bato International Corporation
2. Carsul Steel Corp.
3. 4A'S Development Corp.
4. Lantafe Body Builders & Iron Works
5. Charlie Iron Shop
6. Corrales Welding Shop
7. Pinar Auto Repair Shop
8. Narico Metalcraft
9. Rufino Clapano Welding
10. Gerlyn Welding Shop
11. Mambatac Metal Works
12. Yankent Welding Shop and Construction Glass Services
13. Toteng Welding Shop
14. Loay Machine Shop
15. Body Repair Shop
16. Jelite Steel
17. Balane Welding Shop
18. Cede Machine and Metal Industry, Inc.
19. MS Iron Works
20. Tagbilaran City Machine & Repair Shop
21. Jonash Welding Shop
22. SL DU Metal Works Supply & Services
23. Bohol Machine Shop and Eng'g Services
24. Hermes Metal Furnitures & Design
25. Carmensindo Repair Shop
26. Jumamel Body Building & Welding Shop
27. Tecson Iron Works
28. PGC Iron Works
29. Darunday Machine Shop

REGION VIII

1. 3IJ'S Electrical, Iron & Steelcraft
2. MLS Metalworks
3. Acedera Welding Shop
4. Macmon Welding Shop
5. Joseph 9 Welding Shop
6. 3IJ'S Electrical, Iron & Steelcraft

REGION IX

1. Bugto Vulcanizing Shop
2. Ranilo Calixto
3. JRC Motor Corp.
4. Vito Iron Works
5. Car Moves
6. Daya Vulcanizing & Welding Shop
7. Junie Auto Repair Shop
8. D&L Villarte Welding Shop
9. AS Sevilla Iron Works
10. Danson's Metalcraft
11. JL Cabanducos Iron Works
12. Lemjay Iron Works
13. JR Iron Works
14. Welding Shop & Steel Fabrication
15. Yañez Iron Works
16. Fabria Iron Works
17. Apopatic Welding Shop
18. Apros Welding Shop / Engineering Works
19. Jojo Welding Works
20. Stephen Mario Machine Shop
21. Cris Welding Shop
22. Las Doce Steel Fabrication

REGION XI

1. JAS Machine Shop
2. IVSA Machine Shop and Engineering Works
3. Jotag Machine Shop
4. Asentista's Engineering & Construction Supply
5. Davao Beta Spring, Inc.
6. Allawan Engineering Services and Machine Shop
7. Davao NCG Services, Inc.
8. MFC Machine Shop
9. Truckers Quest Machine Shop
10. MCSG Machine Shop
11. Joseph Lim Engineering Services
12. Davao RV's Fabrication
13. Rimsons Machine Shop
14. New Supreme Machine Shop, Inc.
15. R.C.G. Electroplating Services
16. FCT Industrial Fabricators
17. JFL Steel Fabricator
18. Twin's Stainless Fabrication
19. Venzon Tahimik
20. Vijane Auto Truck Repair Shop & Fabrication
21. Montri Steel Fabrication
22. FB Shutters Services
23. Agdao Steel Works
24. RCSS Stainless Fab And Repair

25. Nelson Welding Shop
26. Ubalde Stainless Fabrication
27. Agdao Intergrated MS
28. Dwight Steel Building System
29. FA Eng'g & Machine Shop
30. Davao Motorcycle Machine Shop
31. Belmark, Inc.
32. RVP Builders & Machine Shop
33. Topline Engineering
34. Joseph Keil Welding Shop
35. Jing Welding Shop
36. JJ JS Machine Shop
37. JM Welding Shop
38. C M Auto Repair Shop
39. Auto Electrical Repair Service
40. P Gasal Machine Shop
41. Palace Welding Shop
42. WR Welding Shop
43. NMRS Steel Works And Welding Shop
44. Boy M Welding Shop

MIRDC INDUSTRY STUDY TEAM

TOP MANAGEMENT

Engr. Robert O. Dizon
Executive Director

Agustin M. Fudolig, Dr. Eng.
Deputy Executive Director for Technical Services

Engr. Jonathan Q. Puerto
Deputy Executive Director for Research and Development

Danilo N. Pilar, Ph.D.
Chief, Technology Diffusion Division

Lina B. Afable
Chief, Technology Information and Promotion Section

Industrial Research and Studies Unit

Eldina B. Pinca
Rosalinda M. Cruz
Jim Patrick S. Erispe
Josephine R. Esguerra
Ma. Rodessa Grace A. Mercado

DEPARTMENT OF SCIENCE AND TECHNOLOGY
METALS INDUSTRY RESEARCH AND DEVELOPMENT CENTER

MIRDC Compound, Gen. Santos Avenue
Bicutan, Taguig City, 1631 Metro Manila
P.O. Box 2449 Makati, 1229 Metro Manila, Philippines
Telephone Nos.: (632) 837-0431 to 38 (connecting all departments)
Fax Nos.: (632) 837-0613 and 837-0430
Website: http://www.mirdc.dost.gov.ph
E-mail: mirdc@mirdc.dost.gov.ph