ISSN: 2277-9655
Impact Factor: 3.785

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

RESOURCES MECHANISM OF REFRIGERATION AND AIR CONDITIONING TECHNOLOGY

Eugenio A. Ermac, Ph.D.
Associate Professor V
Technology Department, College of Education
Cebu Technological University-Main Campus
Philippines

DOI: 10.5281/zenodo.51003

ABSTRACT

This paper is an extensive analytical addendum of the research data utilized in a published research. This study determined the resources mechanism in refrigeration and air conditioning technology at CTU systems. It was conducted for the purpose of providing the administrators and its constituents the basic information on the present status of the refrigeration and air conditioning technology of the Cebu Technological University System Further, it can be inferred that insufficiency is paralleled with the need to upgrade the non-serviceable resources due to obsolescence, propel to produce qualified technology graduates, who are technologically grasp and globally competitive.

KEYWORDS: resources mechanism, refrigeration and air-conditioning technology, acquisition, availability

INTRODUCTION

Energy is the capacity to do work and is required for life processes. An energy resource is something that can produce heat, power life, move objects, or produce electricity. The world's energy demands for refrigeration and air conditioning represent nearly 20% of the energy consumption. [1] Despite the fact that other substances are being used to substitute for existing or already-abandoned harmful refrigerants, many of these are the subject of future prohibition.

MATERIALS AND METHODS

This paper is an extensive analytical addendum of the research data utilized in the published [2] research entitled, “Refrigeration and Air Conditioning Technology: Unravelling Its Status at Work” a European Scientific Journal October 2015 edition vol.11, No.29 [3]. This study was conducted for the purpose of providing the administrators and its constituents the basic information on the present status of the refrigeration and air conditioning technology of the Cebu Technological University System as well as the consequent administrative and technical development program in order to suggest for the improvement of some of its facilities. The findings of the study would benefit the whole system of Cebu Technological University and its clientele to uplift the resources in the institution. The study is generally quantitative in nature. One has to answer questions entailing qualitative and quantitative level of variables. Thus, particularly it employed descriptive statistical process. It collected and analyzed factual data that were easy to account. On the aspect of resources mechanism has to dig deeper the procurement, usability, and maintenance of its facilities stipulated under customer satisfaction of quality management system throughout the nine (9) campuses of the CTU System.

RESULTS AND DISCUSSION

The following figure present the general assessment of Refrigeration and Air conditioning Technology as to the

ISSN: 2277-9655
Impact Factor: 3.785

resources mechanism when it comes to quantity, availability and functionality of the tools and equipment in the three (3) campuses of the System.

Quantity and Availability. Figure 1. The equipment/tools needed for the continuous operation of the Refrigeration and Air Conditioning Technology at the Cebu Technological University System.

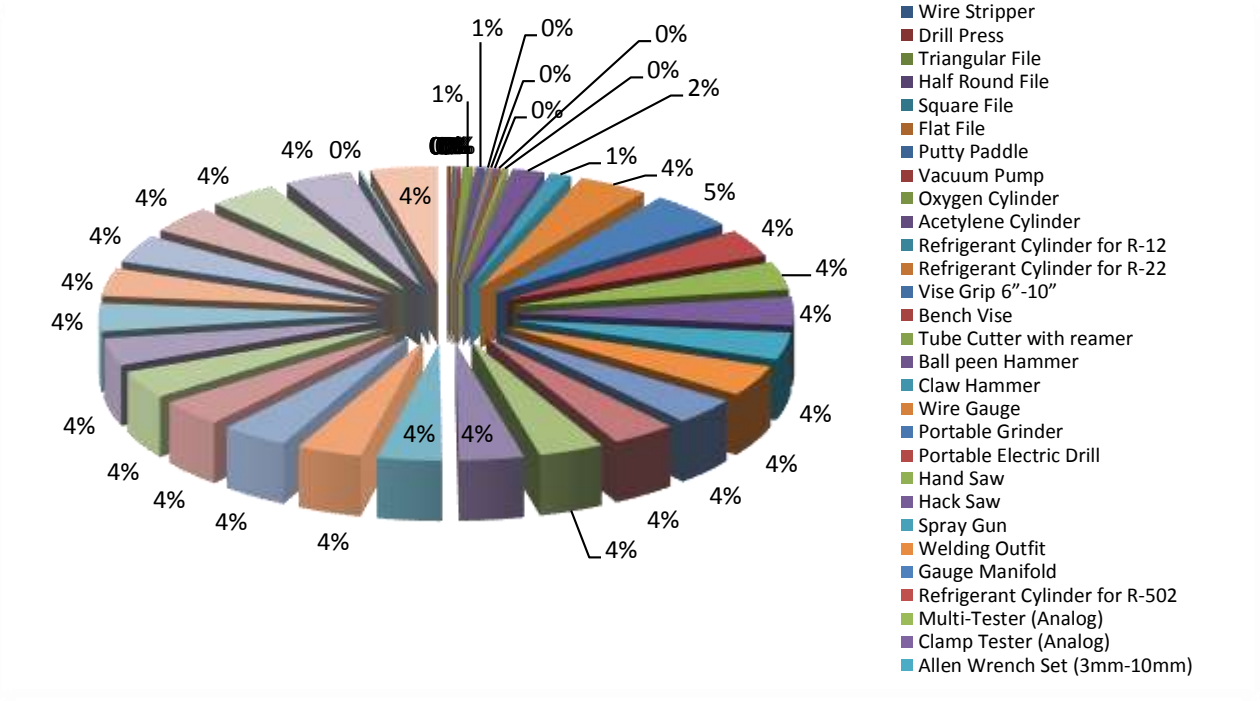

Figure 1
Quantity and Availability

Figures presented were ratio of tool to students across the three campuses

Noticeably, non-existence of the tool was ascribed comprising the equipment/tools for wiring, body building, tubing and tubing applications, or those needed for the actual practice of the trade. Most of the equipment and tools have zero quantity and therefore not available as validated with a verbal description of never used. Among these non-available tools were the Refrigerant Recovery Machine, Service Thermometer and Leak Detectors which are the essential tools for operation and are required by authority such as the Clean Air Act (RA 8749) that prohibits the venting of refrigerants into the atmosphere. Among all equipment and tools, sixteen (16) of which have quantity value ranging from 0.06 to 0.55 and still verbally described as never used. As analyzed by a statistical package the values were expressed as ratio between tools to number of students. Because there was a smaller ratio of tools to students, the existing available equipment/tools reach to an insurmountable level that students believe that these were really not used.

Also, there were equipment/tools validated to have a ratio of more than 1.00 but still were validated as never used. Simply put into RAC parlance, not even half of the student populace in the Refrigeration and Air conditioning Technology have touched and used this tools/equipment in actual laboratory or maintenance work.
Hence, there is a felt need to acquire these tools/ equipment in order to answer the need of students for laboratory or maintenance work, thus ascribing to John Dewey's "Learning by Doing" [4] that states, students should be involved in real-life tasks and challenges. Compared about 20 different technologies, from which they have emphasized the importance of magnetic refrigeration, as being the alternative with the highest level of research activity and the best

ISSN: 2277-9655
Impact Factor: 3.785

experimentally achieved exergy efficiency [5]. However, they also noted that certain technical breakthroughs are required for most of the alternatives to become successful.

Acquisition. Figure 2 catalogued all the equipment/tools with the corresponding acquisition years. It can be seen/counted that seventy one (71) of the tools were rated with 4.78 – 5.00 and verbally described as none. Though, the averages of sixteen (16) tools/equipment such as vacuum pump, acetylene cylinder, refrigerant tank, and others fall in the interval 4.21 – 5.00, verbally described as none**;** for clarity purposes it can be markedly interpreted that there is that margin where these tools/equipment had been acquired in various years but were not being covered in the scoring.

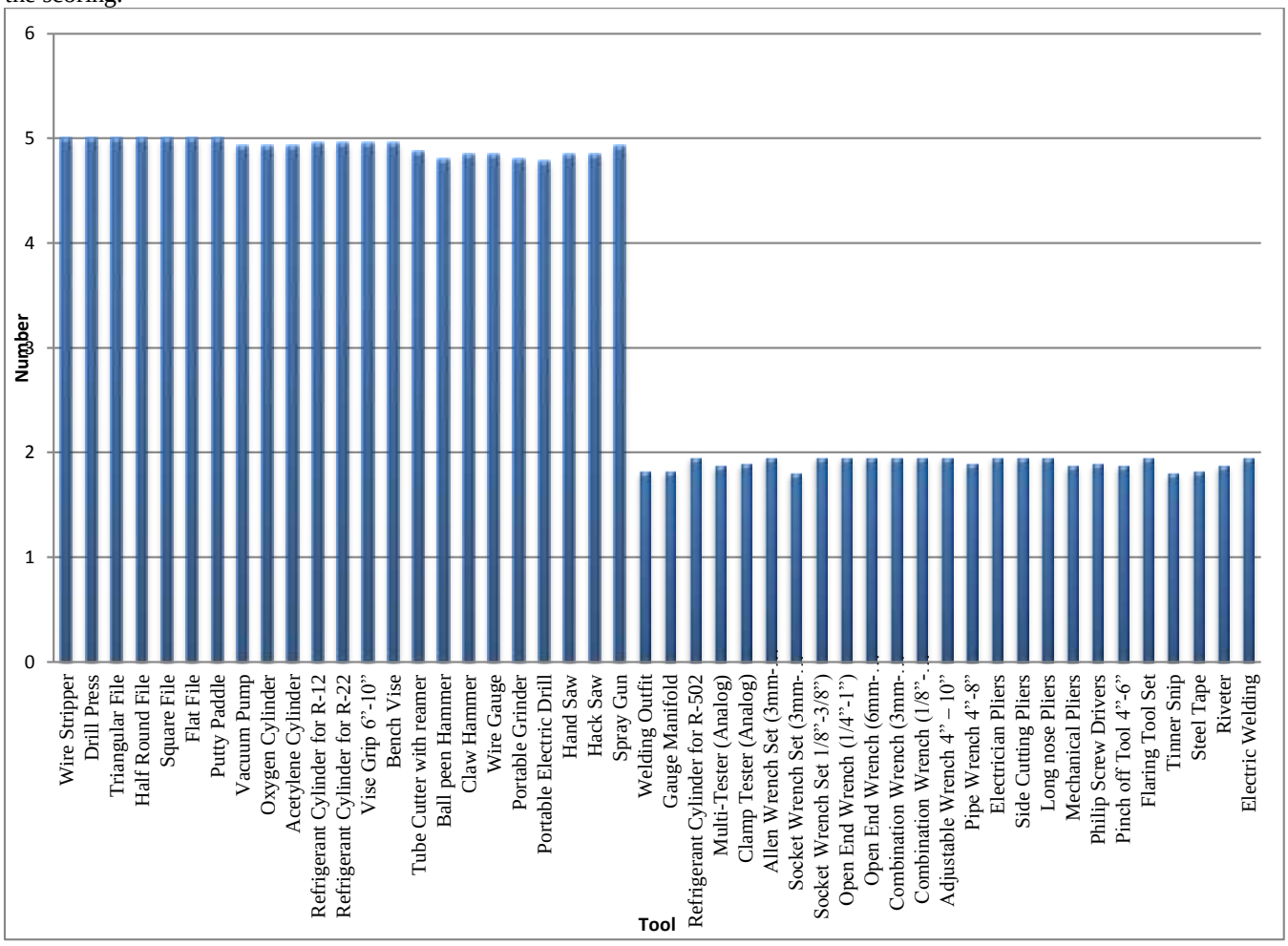

Figure 2
Acquisition

The article of Plaznik et al. (2015) [6] also considered the numerical modeling of the active regenerative cooling device. Besides this publication, the newest publications related to the modeling of refrigeration technology can be found in Gu et al. (2014) [7], Smith et al. (2014)[8], and Mohammadi et al. (2014)[9].It can be inferred that even if these equipment/tools were available in the shop still there is a need to replace stock of these equipment/tools; else, to increase the quantity to compensate aging and above all to encourage students perform better.

Functionality. Arrayed on figure 3 were the equipment/tools validated by the respondents. The validations are whether the tool is of use, else placed only on cabinets strictly labelled "for your eyes only". Fifty five (55)

ISSN: 2277-9655
Impact Factor: 3.785

equipment/tools were validated as non – functional and these are the very same tool/equipment as zero quantity and never used. In same manner, the validation pointed out that non-existence also means non-functional which were limited only to the tools/equipment hereto referred.

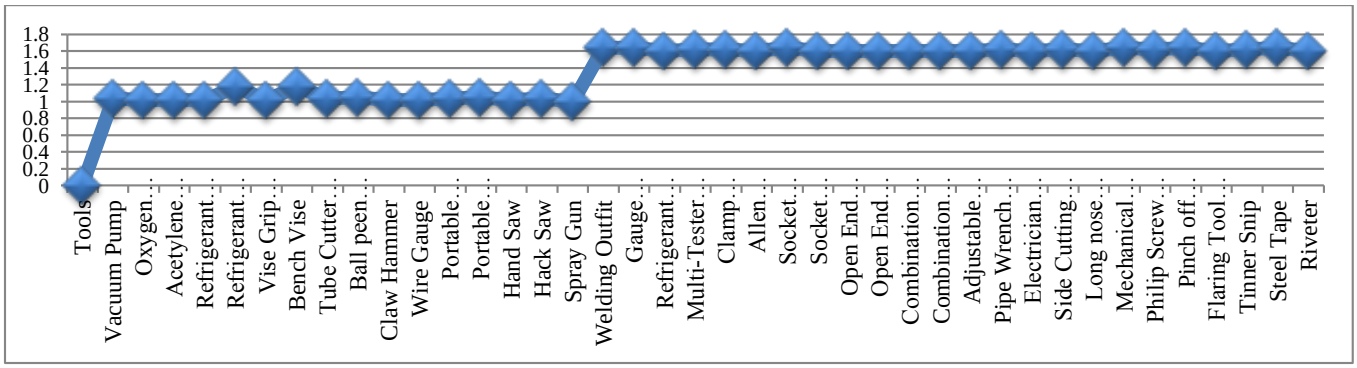

Figure 3
Functionality

The averages were closer to the value 2.00 which means that there were existing tools/equipment available but non functional.

Another set were sixteen (16) equipment/tools, recorded at the validation averages closer to 2.00, verbally described as yes indicating as functional. Although seen to be functional, there is that margin indicating that certain units were not functioning well as used. The table also conveys certain numbers of equipment/tools that were fully functional as seen on the twenty five (25) items with mean validation of 1.29 – 1.35, that verbally said yes.

The fact could not be denied that these equipment/tools were needed in the day to day classes and were not there for use or non – functional anymore. Based on their analyses, they developed estimates for unit energy savings over baseline vapor-compression systems and identified the relevant markets and calculated the technical energy-savings potential for each considered technology. The results of the study revealed that refrigeration represents the most promising alternative for future applications [10]. Hence, procurement or replacement of the same would surely meet the requirement in the teaching-learning process to allow the students hands-on use and care.

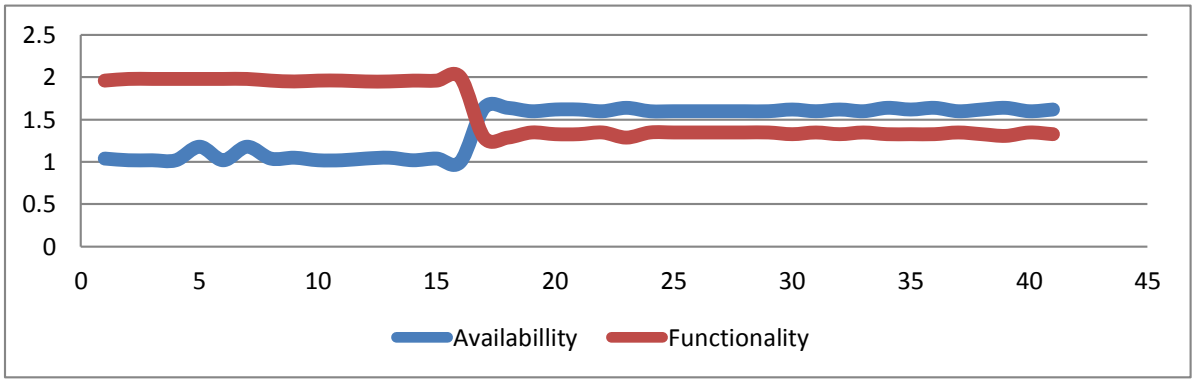

Figure 4
Status of Functionality and Availability

Figure 4 shows certain numbers of tools that were fully functional as seen with mean validation of 1.29 – 1.35. As analyzed by a statistical package the values were expressed as ratio between availability and functionality. There were ratio of tools availability and functionality to an insurmountable level validated a ratio of more than 1.00.

ISSN: 2277-9655
Impact Factor: 3.785

CONCLUSION

The program focuses on developing resources mechanism covering the procurement process, utilization, and the maintenance of tools, instruments, and equipment available in different laboratory shops in all campuses of Cebu Technological University System offering refrigeration and air-conditioning technology, covering the teacher education, engineering, and industrial technology curriculum. Resources mechanism in refrigeration and air conditioning technology were partially developed and needs enhancement in performing teaching-learning process as their major task.

ACKNOWLEDGEMENTS

The author is grateful to the administrator, faculty students and staff of Cebu Technological University for the unmeasurable cooperation and support towards the success of the study.

REFERENCES

[1] http://www.tulane.edu/~sanelson/eens1110/energy.htm
[2] Lapiz, G. Politics of Decisions Towards Discernment. Cebu Normal University, Philippines European Scientific Journal June 2015 edition vol.11, No.17 ISSN: 1857 – 7881
[3] Malabago et. al. Refrigeration and Air Conditioning Technology: Unravelling Its Status at Work" a European Scientific Journal October 2015 edition vol.11, No.29
[4] www.marxists.org/archive/novack/works/1960/x03.htm
[5] Brown, J.S., Domanski, P.A., 2014. Review of alternative cooling technologies. Appl. Therm. Eng. 64 (1e2), 252e262 (A summary of a comprehensive report of DOE from 2011 (US Department of Energy), presented as the comparison of different potential alternative cooling technologies).
[6] Plaznik, U., Kitanovski, A., Rozic, B., Malic, B., Ursic, H., Drnovsek, S., Cilensek, J., Vrabelj, M., Poredos, A., Kutnjak, Z.,2015. Bulk relaxor ferroelectric ceramics as a working body for an electrocaloric cooling device. Appl. Phys. Lett. 106 (4), 043903 (One of rare articles which shows numerical results on the performance of the electrocaloric refrigerator, including description and photos of the conceptual electrocaloric refrigeration device).
[7] Gu, H., Qian, X.-S., Ye, H.-J., Zhang, Q.M., 2014. An electrocaloric refrigerator without external regenerator. Appl. Phys. Lett. 105, 162905.
[8] Smith, N.A.S., Rokosz, M.K., Correia, T.M., 2014. Experimentally validated finite element model of electrocaloric multilayer ceramic structures. J. Appl. Phys. 116, 044511.
[9] Mohammadi, S., Khodayari, A., Mohammadi, P., 2014. Cylindrical ferroelectric heat pump. J. Intel. Mater. Syst. Struct 13, 1045389e14538534.
[10] Burdyny, T., Ruebsaat-Trott, A., Rowe, A., 2014b. Performance modeling of AMR refrigerators. Int. J. Refrigeration 37, 51e62.