5th African International Conference on Industrial Engineering and Operations Management, Johannesburg/Pretoria, South Africa, April 23 - 25, 2024
Publisher: IEOM Society International, USA
Published: April 23, 2024 DOI: 10.46254/AF05.20240119

Investigating Work Delegation and Employee Efficiency in an Engineering Maintenance Service Department

Andile Sabani
Department of Mechanical and Industrial Engineering
Faculty of Engineering and the Built Environment
University of Johannesburg
Johannesburg, South Africa
andilesabani@gmail.com

Paul A. Adedeji
Department of Mechanical Engineering Science
Faculty of Engineering and the Built Environment
University of Johannesburg
Johannesburg, South Africa
padedeji@uj.ac.za

Esther T. Akinlabi
Department of Mechanical and Construction Engineering
Northumbria University,
Newcastle Upon Tyne, United Kingdom
esther.akinlabi@northumbria.ac.uk

Stephen A. Akinlabi
Department of Mechanical and Construction Engineering
Northumbria University,
Newcastle Upon Tyne, United Kingdom
stephen.akinlabi@northumbria.ac.uk

Abstract

Engineering-related maintenance services of organizations are often non-deterministic, and supervisory delegation of work is often inevitable. Employees are expected to be equipped with the necessary capacity for delegated responsibilities. However, there is a need for an investigation of the quality of delivery of delegated responsibilities and the disposition of staff to available multiple efficiency-enhancing tools before a conclusive need for more workforce. This study investigates the performance quality of delegated responsibilities and staff disposition to use technological tools for productivity enhancement. Interview and questionnaire approaches were adopted. 100% sample size was considered for all the Engineering Maintenance Service department employees of one of the leading minerals processing and metallurgical engineering products companies in South Africa. This study investigated the degree to which work is delegated, the quality of performance of delegated work, a correlation between work delegation and quality of service delivery, the need for more personnel, work execution and staff resistance to information technology, and provided machine tools. The need for more effective tools and the preference for manual methods over more efficient methods were also investigated to accommodate staff feedback on work carried out. From

the results obtained, 97% and 93.1% of respondents showed that work is delegated and performed satisfactorily, respectively. However, statistical measures show that some staff do not carry out work to the expected satisfaction ($p=0.001<<0.05$). While 82.8% of the employees attested to the need for an increased workforce in the department, staff's use of information technology for work is less than 80%. Though 96.5% of respondents showed that machine tools provided are always used, 65.5% of staff still preferred the use of manual tools, thus impeding work efficiency. A strong correlation existed between tool efficiency and the use of manual efforts ($p=0.007 << 0.05$) as well. Hence, periodic staff training is necessary for improved efficiency in delegated duties. Though a larger percentage of the workforce advocates for more staff, improving the current workforce's effectiveness would increase the organization's overall productivity without recruiting more staff.

Keywords
Additional staff, information technology, organizational efficiency, supervisory delegation, staff productivity
/

Introduction
The gradually changing organisational dynamics have necessitated an optimal use of available resources for improved overall organisational efficiency and effectiveness. This is vital to corporate growth if such would compete effectively among other similar businesses. Competing effectively in dynamic working conditions requires minimisation of cost quality enhancement and effective service delivery (Chang & Huang, 2005). This demand has recently grown post-pandemic (da Silva et al., 2022). Both manufacturing and service industries aim to leverage all available systems towards increasing workplace efficiency among the human resource element. While several resources are provided to increase staff effectiveness and efficiency, employee reluctance has been observed towards adopting new strategies, leveraging available tools, and providing technological facilities to increase the level of productivity (Rubbab, Naqvi, Irshad, & Zakariya, 2022; Sung, 2018; Vakola & Nikolaou, 2005). Beyond providing work-enabling facilities in the workplace, supervisory delegation of authority is a common practice in organisations with well-defined structures. Superiors are observed delegating responsibility, power, and authority to the junior staff in the vertical reporting line (Hughes, Kirk, & Dixon, 2018; Rubbab et al., 2022). Unfortunately, the efficiency of staff in carrying out delegated responsibility either positively or negatively affects the system's overall productivity. Such reduces the level of completion of assigned tasks and sometimes gives a picture of understaffing (Aliza et al., 2022). However, there is a need to investigate the compliance of employees to dynamic working conditions and supervisory delegation for improved efficiency.

Human resources have been identified as key drivers of an organisation, and their effectiveness significantly influences the organisation's growth and growth rate. Though several technological advancements are gradually reducing the level of human inputs in organisational activities, the role of human activities has not yet been fully substituted with technology. Most especially in service industries with well-defined organisational structures, the delegation of responsibilities between staff is inevitable. Effective delegation enables the senior staff to focus on strategic management activities rather than the operational level of management (Teryima, 2017). For such a work structure, staff are expected to be equipped with the necessary resources for delegated duties for effectiveness and efficiency. This is one of the thirty key performance indicators identified by Dehghani et al. (Dehghani, Gharooni, & Arabzadeh, 2014) for organisational efficiency. However, resistance to the supervisory delegation and technological tools provided for improved work efficiency has been observed in service industries. This has retarded staff productivity and overall organisational efficiency.

The Engineering maintenance department is a dynamic department with varying workloads and frequent unplanned activities. This nature of their service often necessitates delegating work to the available human resources to keep pace with the increasing workload. This is very obvious in organisations with vertical lines of reporting, a more practiced pattern than the horizontal communication level (Asuyama, 2020). While there have been studies investigating the role of supervisory delegation in the medical field(Hughes et al., 2018), in the teaching profession (Rubbab et al., 2022), hospitality sector (Kang, Gatling, & Kim, 2015), and public sector (Jämsen, Sivunen, & Blomqvist, 2022), the investigation of such in the engineering maintenance and service department is scarce in the literature. Furthermore, among these studies, the evaluation of the quality of delegated work has been less explored. The disposition of maintenance staff to the use of provided technological efficiency-improvement tools has also been less explored in the literature. The negative effects of uncompleted tasks and low-quality delivery of responsibilities often give an impression of the need for more staff in the organisation.

Objectives
Work delegation is inevitable in engineering and maintenance departments of organizations. While the challenge that exist in the dynamic nature of work in this department has been earlier presented, this study aims to investigate the degree to which work is delegated, the quality of performance of delegated work, a correlation between work delegation and quality of service delivery, the need for more personnel, work execution and staff resistance to information technology, and provided machine tools. This study also accommodated workers feedback in a view to investigating the need for more effective tools and the preference for manual methods over more efficient methods. It is believed that the results obtained would provide information for operational resource management among workers and also assist with procurement guideline development for equipment purchase at strategic management level.

Methods
The Engineering Maintenance Services (EMS) department of one of the leading mineral processing and metallurgical engineering companies in South Africa was used as a case study. The disposition of supervisory delegation among employees and the effective use of technological tools provided for improved work efficiency were evaluated.

Data Collection and Sampling Technique
Data was obtained by setting up a visit appointment interview with four departmental experts (Human resources, Engineering Maintenance and Services, Finance or Procurement and Warehouse). Interviews were held in the expert departmental office. Interviews were conducted during working hours with an average estimated time of 30 minutes per interviewee. Interview information was converted from audio communication (qualitative) to quantitative data for analysis by extracting keywords from statements made.

Interviews were conducted with key experts in different departments, focusing mainly on EMS division, then human resources, finance, procurement, warehouse and stores departments. For the survey to be successful, it required 50% or more of the participants of EMS staff to respond to the questionnaires. The population consists of different ethnic groups, tribes, genders and designations. This subsection was selected because it has the most critical challenges, such as meeting divisional targets, poor performance and utilisation of resources. A total of 29 respondents was recorded for this project.

Data analysis
Descriptive and inferential statistical analyses of the collected data were carried out. This includes analysing the qualitative and quantitative data obtained from the interview and questionnaire. A correlation between the responses from the respondents in the EMS department was also carried out, and the inferences from this were reported accordingly.

Results and Discussion
Descriptive and inferential statistical analyses were carried out to establish the status of resources used in the selected department. Correlation between different variables in the questionnaire was also investigated to statistically determine the reason for under-utilisation and over-utilisation of specific resources (human resources, information technology, machines and tools) in the EMS department.

Supervisory delegation
The degree of work delegation was investigated in the department. This is to determine the extent to which duties are being delegated to staff of the EMS department under consideration. From Figure 1, it can be established that about 97 % of the respondents showed that jobs are delegated to the staff of the EMS department, e.g. in the absence of the Manager or Supervisor of the department, section subordinates are delegated. This is an indication of shared responsibility, and this could eliminate redundancy in the department.

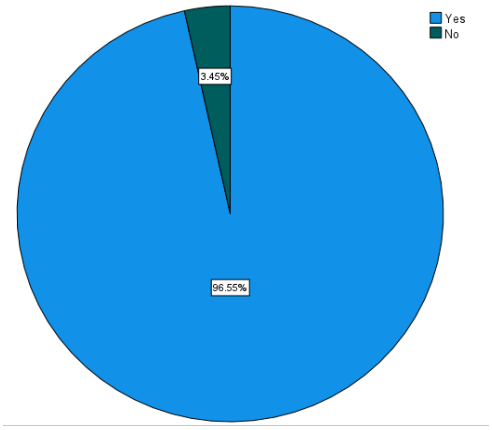

Figure 1. Work delegation to staff

Quality of performance of delegated jobs

Staff members of the EMS division of the organisation are expected to carry out delegated jobs with the desired quality. This was investigated, and the result is shown in Figure 2. It was observed that 93.10% of the staff indicated that the delegated work is often carried out with the best quality, which is commendable. However, 6.90 % of the staff indicated that the delegated jobs are not often carried out with the best of quality.

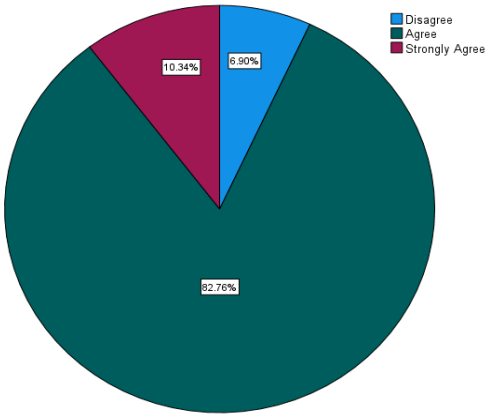

Figure 2. Quality of performance of delegated job

Correlation between the work delegation and quality of work being carried out

While it is necessary that work be delegated to staff members in the department to improve productivity and enhance the efficiency of the department, it is necessary to investigate whether correlation delegation is being carried out. Table 1 presents the result of the correlation between the work delegation and the quality of the work being carried out. It can be rightly said that a significant difference ($p=0.001 << 0.05$) exists between the quality of work being done and the delegated work. This shows that some staff do not do the work assigned to them to the best of expected quality. Though the staff claimed that the jobs assigned are carried out to the best of quality, this is not so.

Table 1. Pearson correlation between work delegation and quality of work

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.982[a]	2	.001
Likelihood Ratio	5.927	2	.052
Linear-by-Linear Association	6.250	1	.012
N of Valid Cases	29		

a. 5 cells (83.3%) have expected count less than 5.
b. The minimum expected count is .07.

Need for More Personnel

The need for more personnel in the department was also investigated, and the result obtained is presented in Table 2. It was observed that while 82.8% of the respondents indicated the need for more personnel in the department, 17.2% indicated no need for more personnel. While keeping the objective side of this investigation, further investigations using other questions speaking to the productivity of the staff in the department were carried out. This is necessary to determine the productivity of the current workforce and their disposition to efficiency-enhancing tools provided by the organisation.

Table 2. The need for more personnel in EMS department

Responses	Frequency	%	Valid Percent	Cumulative Percent
Disagree	5	17.2	17.2	17.2
Agree	21	72.4	72.4	89.7
Strongly Agree	3	10.3	10.3	100.0
Total	29	100.0	100.0	

Work execution and staff responsiveness in using information technology

The percentage of work done electronically in the EMS department was also investigated, and the results of the responses from respondents regarding this are presented in Table 3. It was observed that only 60-79 % of the works which can be electronically executed in the department are carried out electronically. While the volume of this work is above average, it still reveals the level of underutilisation of information technology in the department. This could be due to the lack of technical know-how by staff or inadequate facility for this. The effect of this can be observed in the staff responsiveness to electronic mail, as presented in Table 4. From Table 4, 24.1% of the staff disagree that staff of the EMS department are highly responsive to emails even though 75.9 % agree that staff of the department are highly responsive to emails. To ensure that responsiveness to emails among staff is enhanced, it is needful that further investigation be carried out as to the level of training of staff on the use of email clients used in the organisation and the work ethics of members of staff be further investigated.

Table 3. Electronic work execution in the department

Percentage	**Frequency**	**%**	**Valid Percent**	**Cumulative Percent**
0-39%	8	27.6	27.6	27.6
40-59%	9	31.0	31.0	58.6
60-79%	10	34.5	34.5	93.1
80-100%	2	6.9	6.9	100.0
Total	29	100.0	100.0	

Table 4. Staff responsiveness to electronic mail

Response	**Frequency**	**%**	**Valid Percent**	**Cumulative Percent**
Disagree	7	24.1	24.1	24.1
Agree	16	55.2	55.2	79.3
Strongly Agree	6	20.7	20.7	100.0
Total	29	100.0	100.0	

Utilisation of provided machine tools

The responses reported in Table 5 were obtained from investigating whether the staff of the EMS department always use the provided machine tools. It was observed that 96.5% of the respondents shows that the provided tools are always used. This illustrates the conformity of the staff to standard operating procedures of the department and the organisation as a whole. This often prevents accidents from occurring and ensures the safety of staff members.

Table 5. Utilisation of provided machine tools

Response	Frequency	%	Valid Percent	Cumulative Percent
Strongly Disagree	1	3.4	3.4	3.4
Agree	21	72.4	72.4	75.9
Strongly Agree	7	24.1	24.1	100.0
Total	29	100.0	100.0	

Tool Effectiveness and Need for More Tools

The effectiveness of the tools provided was investigated to ensure productivity decrease is not due to lack of requisite tools. Table 6 presents the participants' responses on the effectiveness of working tools. Though 86.2 % of the respondents attested to the effectiveness of the working tools in the department, 13.8 % disagreed that the working tools are effective. This could suggest an overhaul or equipment audit to ensure that the state-of-the-art tools are used for maintenance operations. This will reduce throughput, ease the maintenance process, and reduce staff fatigue due to obsolete and less effective tools.

Table 6. Effectiveness of provided machine tools

Response	Frequency	%	Valid Percent	Cumulative Percent
Strongly Disagree	2	6.9	6.9	6.9
Disagree	2	6.9	6.9	13.8
Agree	23	79.3	79.3	93.1
Strongly Agree	2	6.9	6.9	100.0
Total	29	100.0	100.0	

The need for more working tools by the EMS department was also investigated. From the findings, it was observed that 79.3% of the respondents agreed that more working tools are needed, as presented in Table 7. This further points to the need for a work system audit. Though the need for more tools have been established, 65.5% of the staff still prefer to use manual efforts compared to the provided tools as presented in Table 8.

Table 7. The need for more working tools

Response	Frequency	%	Valid Percent	Cumulative Percent
Strongly Disagree	2	6.9	6.9	6.9
Disagree	4	13.8	13.8	20.7
Agree	14	48.3	48.3	69.0
Strongly Agree	9	31.0	31.0	100.0
Total	29	100.0	100.0	

Table 8. Preference of Manual Efforts to working tools provided

Response	Frequency	%	Valid Percent	Cumulative Percent
Strongly Disagree	1	3.4	3.4	3.4
Disagree	9	31.0	31.0	34.5
Agree	17	58.6	58.6	93.1
Strongly Agree	2	6.9	6.9	100.0
Total	29	100.0	100.0	

Association between tool effectiveness and preference of manual efforts for tools provided

It was observed that staff prefer to use manual efforts to the provided working tools, presumably in some cases. Hence, the association between the effectiveness of working tools and the preference for manual efforts to such tools was further investigated. The results of the analysis are shown in Table 9. It was noted that there is an association between the tool effectiveness and the preference of the staff to use manual effort, which is statistically significant ($p=0.007 << 0.05$). The null hypothesis that the provided tools are effective should be rejected. Hence, if the tools provided are effective as previously claimed, there will be no need for manual efforts as replacements for more effective means of carrying out operational duties by staff.

Table 9. Association between tool effectiveness and preference of manual efforts to tool provided

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22.760[a]	9	.007
Likelihood Ratio	14.038	9	.121
Linear-by-Linear Association	.309	1	.578
N of Valid Cases	29		
a. 14 cells (87.5%) have expected count less than 5. The minimum expected count is .07.			

Shown in Appendix A is the Pearson bivariate correlation results of critical variables of interest to the study. The values measure the direct linear relationship between each of the selected variables. The results with the Pearson's correlation value further substantiates the relationship between the current working conditions and the workers' disposition to work. For instance, tool effective to staff idleness (Pearson correlation= 0.507) significant at 0.01 level shows the level of idleness of workers that can be expressed by the ineffectiveness of the tools provided for work. A negative correlation also exist between work delegation and the quality of jobs carried out in the maintenance department. Hence, the need for re-skilling and training of workers.

Conclusion

Dynamic nature of the work in maintenance departments of organizations necessitates delegation of tasks to reduce operational downtime. However, effectiveness of the maintenance workforce is crucial in achieving this responsibility and improving productivity within the department and the organisation at large. Engineering maintenance operational activities can be highly stochastic on a daily basis. However, while the level of output and activities might show that more workforce is needed, there is a need for an investigation of the efficiency of the current workforce. Consequential improvement in the current workforce might provide a solution to the low productivity challenge. Hence, this study investigated the work delegation and employee effectiveness in the engineering maintenance section of one of the leading mineral processing and metallurgical engineering companies in South Africa.

From the findings obtained, more jobs are delegated to the staff of the EMS department, and responsibility is shared among the staff. While the practice of delegating is good, there is a need for optimal load balancing to prevent over-utilisation of the staff if a Pareto skewness in efficiency is noticed. An investigation into the amount of delegated work is recommended in this regard.

The need for additional staff was also investigated and the findings showed no need for additional workforce. The correlation between the staff's use of information technology and the use of tools provided for improved work effectiveness was further investigated as these can be viewed as enablers for improved effectiveness in the department. While about 96.5% of the staff showed that machine tools necessary to perform delegated duties are often provided to them, many still preferred manual efforts over productivity-enhancement tools. A strong correlation existed between tool efficiency and the use of manual efforts ($p=0.007 << 0.05$) as well.

Overall, periodic staff upskilling and training on existing equipment/tools are necessary to leverage the current workforce capacity and strength. Also, quality inspection of the tools procured is essential to avoid workers' resistance to their use. Increasing the productivity of the staff and minimising resistance to the use of tools provided also requires incentives like motivation and recognition of good performance (e.g. having a good performer of the month where that employee can be incentivized).

Declarations

This study was performed under the ethical clearance approval of the University of Johannesburg, Faculty of Engineering and the Built Environment (FEBE) Ethics and Plagiarism Committee (FEPC) (Ethical Clearance Number UJ_FEBE_FEPC_00249 and 11 August 2021).

References

Aliza, K., Shaheen, S., Malik, M. J., Zulfiqar, S., Batool, S. A., Ahmad-ur-Rehman, M., & Javed, A.,Linking ostracism with employee negligence behavior: a moderated mediation model. *Service Industries Journal*, *42*(11–12), 872–896,2022. https://doi.org/10.1080/02642069.2021.1933456

Asuyama, Y.,Delegation to workers across countries and industries: Interacting effects of social capital and coordination needs. *International Journal of Industrial Organization*, *69*, 102586,2020. https://doi.org/10.1016/j.ijindorg.2020.102586

Chang, W. J. A., & Huang, T. C. (2005). Relationship between strategic human resource management and firm performance: A contingency perspective. *International Journal of Manpower*, *26*(5), 434–449. https://doi.org/10.1108/01437720510615125

da Silva, L. B. P., Soltovski, R., Pontes, J., Treinta, F. T., Leitão, P., Mosconi, E., … Yoshino, R. T.,Human resources management 4.0: Literature review and trends. *Computers and Industrial Engineering*, *168*(March),2022. https://doi.org/10.1016/j.cie.2022.108111

Dehghani, S., Gharooni, A., & Arabzadeh, A. ,Staff Empowerment, Entrepreneurial Behaviors and Organizational Efficiency in Iranian Headquarter Education. *Procedia - Social and Behavioral Sciences*, *109*, 1130–1141,2014. https://doi.org/10.1016/j.sbspro.2013.12.600

Hughes, B. M., Kirk, R., & Dixon, A. , Supervision , direction and delegation. *Kai Tiaki Nursing New Zealand*, *24*(3),2018.

Jämsen, R., Sivunen, A., & Blomqvist, K. (2022). Employees' perceptions of relational communication in full-time

remote work in the public sector. *Computers in Human Behavior*, *132*(July 2021). https://doi.org/10.1016/j.chb.2022.107240

Kang, H. J. (Annette), Gatling, A., & Kim, J. (Sunny)., The Impact of Supervisory Support on Organizational Commitment, Career Satisfaction, and Turnover Intention for Hospitality Frontline Employees. *Journal of Human Resources in Hospitality and Tourism*, *14*(1), 68–89,2015. https://doi.org/10.1080/15332845.2014.904176

Rubbab, U. e., Naqvi, S. M. M. R., Irshad, M., & Zakariya, R. (2022). Impact of supervisory delegation on employee voice behavior: role of felt obligation for constructive change and voice climate. *European Journal of Training and Development*. https://doi.org/10.1108/EJTD-01-2022-0006

Sung, T. K. ,Industry 4.0: A Korea perspective. *Technological Forecasting and Social Change*, *132*(October 2017), 40–45,2018. https://doi.org/10.1016/j.techfore.2017.11.005

Teryima, J. , Effective delegation of authority as a strategy for task accomplishment and performance enhancement in business organizations: An empirical survey of flour mills of Nigeria plc, Lagos-Nigeria. *The Business and Management Review*, *8*(4), 138–157,2017.

Vakola, M., & Nikolaou, I., Attitudes towards organizational change: What is the role of employees' stress and commitment? *Employee Relations*, *27*(2), 160–174,2005. https://doi.org/10.1108/01425450510572685

Biography

Andile Sabani is a post graduate student in Masters of technology in Operations Management at University of Johannesburg. He had bachelors of technology in Operations Management, Electrical Engineering and certificate in New Managers Programme. Andile has experience of 20 years' experience in Engineering, Maintenance and Services in the manufacturing, mining, telecommunications and FMCG sectors.

Dr Paul Adedeji is a postdoctoral research fellow in the Department of Mechanical Engineering, University of Johannesburg. He had his master degree in Industrial and Production Engineering. Paul has worked in the area of organisational development and system optimisation. He currently works in the energy sector, developing strategic energy plans for districts and local municipalities. He integrates artificial intelligence into the energy sector. He is a Certified Energy Manager under the Association of Energy Engineers.

Prof Esther Akinlabi - Professor Esther Akinlabi is a Professor of Mechanical Engineering, currently serving as the Deputy Faculty Pro Vice Chancellor for Research and Knowledge Exchange, Faculty of Engineering and Environment, Northumbria University, Newcastle, UK. In her most recent role, she served as the Director of Pan African University Life and Earth Sciences Institute (PAULESI), Ibadan, Nigeria. Prior to joining PAULESI, she had a decade of meritorious service at the Department of Mechanical Engineering Science, University of Johannesburg (UJ), South Africa. At UJ, she served as the HOD of the Department of Mechanical Engineering Science and as Vice Dean for Teaching and Learning for the Faculty of Engineering and Built Environment (FEBE). Her research interests are in modern and advance manufacturing processes which include Friction Stir Welding and Additive Manufacturing. She has filed two patents, edited four books, co-authored seven books, and authored/co-authored over 700 peer reviewed publications.

Prof Stephen Akinlabi is currently an Associate Professor at the Department of Mechanical and Construction Engineering, Northumbria University, Newcastle, United Kingdom and holds a doctorate (D.Eng.) in Mechanical Engineering from the University of Johannesburg, South Africa. Stephen is a recipient of over fifteen (15) grants from industries, external funders, universities, and research organization to support his research activities. He has supervised Seven (7) PhDs and Eleven (11) master's to completion and currently supervising Twelve (12) Postgraduates and has co-authored several peer-reviewed publications. Stephen's research areas primarily focused on Materials and Modern Advanced Manufacturing Systems and to date, he has supervised and worked with both undergraduate and postgraduates in the fields of Laser materials processing and Laser-based additive manufacturing, laser metal deposition & functional graded material; Thin film and modern surface engineering; Welding processes which include friction stir welding, laser welding, MIG & TIG welding, hybrid welding, material characterization and mechanical properties of materials, surface engineering and modifications. In addition, Stephen's secondary research interest extends into sustainability engineering and operations management, numerical simulation and modelling of

manufacturing systems; renewable energy systems, Waste to wealth Management; and renewable energy studies – wind and solar.

Appendix A

		Work Delegation	Job Quality	More Personnel	Tool Use For Jobs	Need for More Tools	Tool Effectiveness	Manual Efforts Preference	Service Training	Training Frequency	Training Usefulness	Staff Equipping	Staff Idleness	Equipment Maintenance Promptness
Work Delegation	Pearson Correlation	1	-.472**	0.025	-0.055	-0.008	0.041	0.09	0.013	0.136	-0.127	-0.238	0.082	0.078
	Sig. (2-tailed)		0.01	0.897	0.776	0.969	0.831	0.641	0.945	0.48	0.512	0.214	0.673	0.686
Job Quality	Pearson Correlation	-.472**	1	0.171	.399*	0.193	0.018	-0.089	0.346	-0.343	0.124	0.363	0.036	0.035
	Sig. (2-tailed)	0.01		0.375	0.032	0.317	0.925	0.648	0.066	0.069	0.521	0.053	0.853	0.859
More Personnel	Pearson Correlation	0.025	0.171	1	0.263	0.317	-0.134	-0.063	-0.144	-0.096	.375*	-0.112	-0.161	-0.144
	Sig. (2-tailed)	0.897	0.375		0.169	0.094	0.487	0.744	0.455	0.622	0.045	0.562	0.404	0.457
Tool Use For Jobs	Pearson Correlation	-0.055	.399*	0.263	1	.537**	0.25	-.400*	-0.098	0.117	0.057	-0.122	.583**	0.043
	Sig. (2-tailed)	0.776	0.032	0.169		0.003	0.192	0.032	0.611	0.547	0.771	0.53	<.001	0.825
Need for More Tools	Pearson Correlation	-0.008	0.193	0.317	.537**	1	.396*	-.481**	-0.328	0.291	-0.115	-0.165	.463*	-0.309
	Sig. (2-tailed)	0.969	0.317	0.094	0.003		0.033	0.008	0.082	0.126	0.553	0.392	0.011	0.103
Tool Effectiveness	Pearson Correlation	0.041	0.018	-0.134	0.25	.396*	1	-0.105	-0.351	-0.07	-0.09	-0.109	.507**	0.129
	Sig. (2-tailed)	0.831	0.925	0.487	0.192	0.033		0.588	0.062	0.718	0.642	0.573	0.005	0.504
Manual Efforts Preference	Pearson Correlation	0.09	-0.089	-0.063	-.400*	-.481**	-0.105	1	0.292	-0.174	-0.024	-0.144	-0.207	0.299
	Sig. (2-tailed)	0.641	0.648	0.744	0.032	0.008	0.588		0.125	0.366	0.903	0.455	0.281	0.115
Service Training	Pearson Correlation	0.013	0.346	-0.144	-0.098	-0.328	-0.351	0.292	1	-.391*	0.351	.385*	-0.361	.441*

	Sig. (2-tailed)	0.945	0.066	0.455	0.611	0.082	0.062	0.125		0.036	0.062	0.039	0.054	0.017
Training Frequency	Pearson Correlation	0.136	-0.343	-0.096	0.117	0.291	-0.07	-0.174	-.391*	1	-0.356	-0.183	0.21	-.374*
	Sig. (2-tailed)	0.48	0.069	0.622	0.547	0.126	0.718	0.366	0.036		0.058	0.342	0.274	0.046
Training Usefulness	Pearson Correlation	-0.127	0.124	.375*	0.057	-0.115	-0.09	-0.024	0.351	-0.356	1	0.307	-.411*	.378*
	Sig. (2-tailed)	0.512	0.521	0.045	0.771	0.553	0.642	0.903	0.062	0.058		0.105	0.027	0.043
Staff Equipping	Pearson Correlation	-0.238	0.363	-0.112	-0.122	-0.165	-0.109	-0.144	.385*	-0.183	0.307	1	-.519**	0.264
	Sig. (2-tailed)	0.214	0.053	0.562	0.53	0.392	0.573	0.455	0.039	0.342	0.105		0.004	0.167
Staff Idleness	Pearson Correlation	0.082	0.036	-0.161	.583**	.463*	.507**	-0.207	-0.361	0.21	-.411*	-.519**	1	-0.107
	Sig. (2-tailed)	0.673	0.853	0.404	<.001	0.011	0.005	0.281	0.054	0.274	0.027	0.004		0.58
Equipment Maintenance Promptness	Pearson Correlation	0.078	0.035	-0.144	0.043	-0.309	0.129	0.299	.441*	-.374*	.378*	0.264	-0.107	1
	Sig. (2-tailed)	0.686	0.859	0.457	0.825	0.103	0.504	0.115	0.017	0.046	0.043	0.167	0.58	

** - Correlation is significant at the 0.01 level (2 –Tailed Test)
* - Correlation is significant at the 0.05 level (2 –Tailed Test)