


“Growing ostgraduate critical mass for sustainable development: experiences from Durban University of Technology”

AUTHORS

Siyabonga Chule
Bloodless Dzwairo  <http://orcid.org/0000-0002-0127-2978>
ResearcherID: L-3155-2015
Sibusiso Moyo

ARTICLE INFO

Siyabonga Chule, Bloodless Dzwairo and Sibusiso Moyo (2015). Growing ostgraduate critical mass for sustainable development: experiences from Durban University of Technology. *Environmental Economics*, 6(1-si), 172-194

RELEASED ON

Friday, 05 June 2015

JOURNAL

"Environmental Economics"

FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

© The author(s) 2025. This publication is an open access article.

Siyabonga Chule (South Africa), Bloodless Dzweiro (South Africa), Sibusiso Moyo (South Africa)

Postgraduate critical mass for sustainable development: experiences from Durban University of Technology

Abstract

Human capacity growth is analyzed quantitatively and tackled critically for the functional purpose of meeting the challenges of sustainability in the South African context. The progression of Bachelor of Technology degree (BTech) students is studied for the academic period 2004-2014 as these form a potential pool of postgraduate candidates at the Durban University of Technology (DUT). The first objective of the research study involved analyzing the enrolment and graduation rates. The second objective was to assess the type of enrolments (part-time/full-time) and to correlate the gender, the ethnic groups and the demographic factors. The third objective was to quantify the academic year frequencies for graduates in the enrolled qualifications and finally the authors evaluated and scaled the popularity of qualifications in the respective faculties.

The findings in this research indicated a 'strong growth' of expertise for the human capacity development, presented by a concentrated large number, at an erratic progress for sustainability of the potential pool of postgraduate students. The indicated 'strong growth' was found in the Management Sciences Faculty within the Business Studies Unit, and in Civil Engineering in the Civil Engineering and Surveying Department. The lack of strong growth in other areas within some of the qualifications in faculties could be due to a lack of the diverse expertise in other disciplines of Management Sciences and Engineering amongst other reasons. In the Applied Sciences the low numbers of scientists indicates the low throughput as a reflection of low enrolments.

The enrolments numbers are low but there is a huge potential as demand continues to increase so to realize the skills targets in the knowledge economy as outlined by the South African National Development Plan targets for 2030. Additionally, the high numbers of engineers are key towards South Africa's infrastructure development.

Keywords: green economy, human capacity development, sustainability, post-graduate incubation, qualification graduates frequency, overall graduates frequency, throughput rate; participation rate, popularity rate.

JEL Classification: C02, C18, C61, C83, I23, I25, O15, Q28.

Introduction

In addressing the challenges of knowledge development in the higher education sector and training as outlined by the National Development Plan (NDP) (National Planning Commission, 2013), the sustainability of the knowledge economy is critically focused on the development level of postgraduates. The major critical targets, envisioned for the year 2030 require solid foundations and aspirations for the realization of the projected goals. These include increasing graduate outputs in the Science, Technology, Engineering and Mathematics to more than 100 doctoral graduates per million per year from the current rate of 28 per million per year; to increase the participation rate to more than 30%; to increase the graduation rate to more than 25%; and further to instil the urgency of knowledge towards the breeding of an economy termed 'Green Economy'. The green economy according to (Musango et al., 2014) first appeared 20 years ago in the report "Blueprint of the Green Economy" (Barbier et al., 1989). The first Earth Summit

on the global sustainable development in 1992 was in Rio de Janeiro (Wynberg, 2002). The Johannesburg Summit in 2002 engaged the private sector (Von Frantzius, 2004) and in 2012 the greening tool for the economy was presented in the Rio+20 conference and the new global development goals were established by the United Nations goals (UN Conference on Sustainable Development, 2012). The green economy challenges the outputs that are directly focused on critical natural resources for human needs and environmental demands in a manner that is not adversative to future generations' benefits.

The postgraduate studies and development of critical mass through incubation are focused on as integral in realizing the aimed visions of the economy. The growth in human capacity is studied quantitatively and tackled for a functional purpose of challenging the South African human capacity growth plans through research engagement. The NDP for the 2030 vision aims to increase enrolments and the number of doctoral graduates which is focused on human capacity development (National Planning Commission, 2013). Hence, the critical mass of BTech graduates was analyzed for the knowledge economy demands (Nafukho et al., 2004) and the scarce skills critical to engage on the knowledge demands of the economy in order to sustain the development of the green economy. The aim of this analysis was to raise human capi-

© Siyabonga Chule, Bloodless Dzweiro, Sibusiso Moyo, 2015.
Siyabonga Chule, Dr., Research and Postgraduate Support, Durban University of Technology, South Africa.
Bloodless Dzweiro, D.Tech., Research Fellow, Institute of Systems Science, Durban University of Technology, South Africa.
Sibusiso Moyo, Ph.D., Director, Institute of Systems Science, Durban University of Technology, South Africa.

tal capacity in order to engage with research activities on the economy that is constrained by the environmental natural capital, water security, environmental protection, climate change, technological change and need for energy (Musango and Brent, 2014; Jouvett and de Perthuis, 2013; Schmalensee, 2012; van der Ploeg and Withagen, 2013; Bartelmus, 2013). The question being addressed in this research article is, how far is sustainable incubation from realizing the envisioned target aims of the NDP 2030 in the South African higher education sector?

The theory necessary to incorporate the developments into the green economy through the interventions in the knowledge economy is the human capital theory (David & Lopez, 2001). Human capital theory by (Romer, 1987) is defined as “a continuation of the growth theory, which considers knowledge as more endogenous”. In this definition increasing returns to organizations are seen as being due to the investment in human capital through specialization. Increasing returns to organizations are due to investment in human capital through specialization”. The definition by David and Lopez (2001) defines Human capital as “acquired human capabilities that are durable traits yielding some positive effects upon performance in socially valued activities”. These socially valued activities clarify the benefits to both the social environment and the human capabilities. The harvested benefit through research engagement is the intellectual capital which Petty and Guthrie (2000) considered instrumental in the determination of enterprise value and national economic performance. The structure of human capital has to be initiated on the proposed environmental initiatives through knowledge-based investments approach (Obamba, 2013) to deal with the costs and the natural growth benefits of the green economy by cultivating early research engagement into a continuous developmental research practise.

According to the Council on Higher Education (Council on Higher Education, 2014) the highest enrolments by ethnic groups at tertiary institutions in South Africa in descending order are: Africans, Whites, Indians and Coloured. The females were leading on enrolments and success rates. However, male headcounts were found to lead in the higher degrees (Masters and Doctoral degrees). Participation rates were highest for Whites and Indians at about 47% and 57%, respectively. The lowest rate was for Africans at 13% which indicated a huge need for early development in tertiary institutions.

This research paper aimed to assess the sufficiency of the human capital development in tackling sustainability in the global challenges facing South Africa (National Planning Commission, 2013). The data of a pool of BTech graduates was analyzed quantitatively

in the academic period from 2004 to 2014 in order to draw supporting remarks for the sustainability of skills and the knowledge capacity development.

The first objective of the research study was to analyze enrolment/graduation rates. The second objective involved the analysis of enrolments by gender, demographic factors and mode of enrolment. The low numbers of full-time enrolments complemented the high number of working class students. The low participation rate and the low enrolments demographically from outside South Africa showed a lack of progression and sustainability for students completing diplomas between the ages 20 and 24. The third objective was to quantify the academic year qualifications’ frequencies for the graduates in the offered qualifications. The final objective was to evaluate the popularity of the qualifications in the respective faculties.

1. Study area

The map which allocates the university in the municipality districts of eThekweni and uMgungundlovu is shown in Figure 1.

The Durban University of Technology is an Institution of higher education that is enshrined in the province of KwaZulu-Natal in the cities of Durban and Pietermaritzburg. The institution underwent a number of transformations from the past education system in South Africa. It channeled itself into a stream of learning experiences that currently (2014) is representative of the diversity in its community’s learning culture, with the vision to develop leadership in technology and productivity as a preferable center of knowledge and technological practices (Division of Corporate Affairs, 2008).

The five university campuses situated in the city Durban are Brickfield, City, Steve Biko, Riston, and ML Sultan. The campuses’ locations are shown in the Durban DUT footprint of Figure 1.

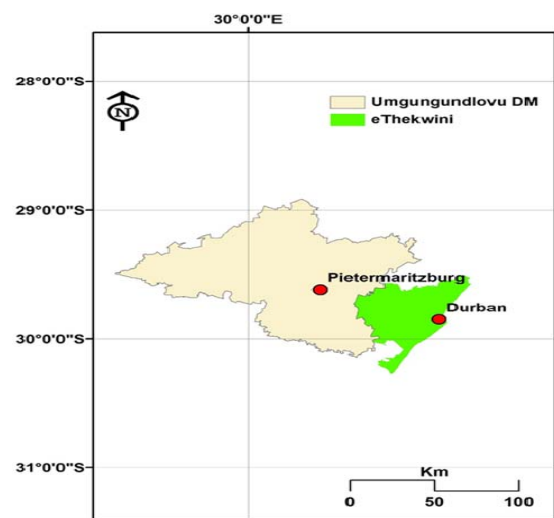


Fig. 1. The footprint of DUT campuses in uMgungundlovu and eThekweni District Municipalities

The Pietermaritzburg campuses are PMB (Riverside) and Indumiso. Riverside predominantly offers commerce courses while Indumiso is mainly for the departments of Education and Civil Engineering (Division of Corporate Affairs, 2008). The allocations of the campus sites in the uMgungundlovu District Municipality are shown in Figure 2.

Durban University of Technology has six faculties: Arts & Design, Accounting & Informatics, Health Sciences, Applied Sciences, Engineering and the Built Environment and Management Sciences.

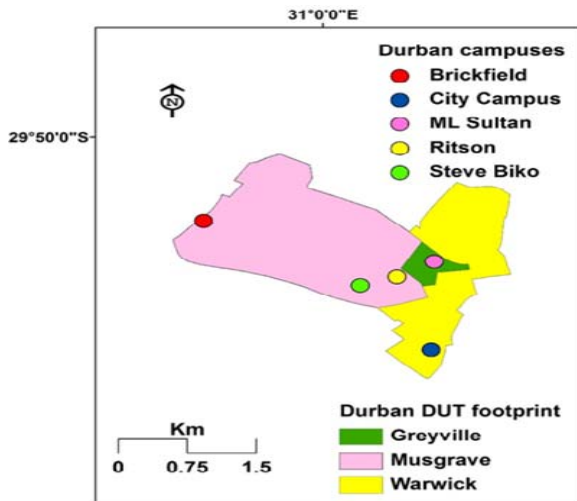


Fig. 2. DUT Durban campuses in eThekweni Municipality

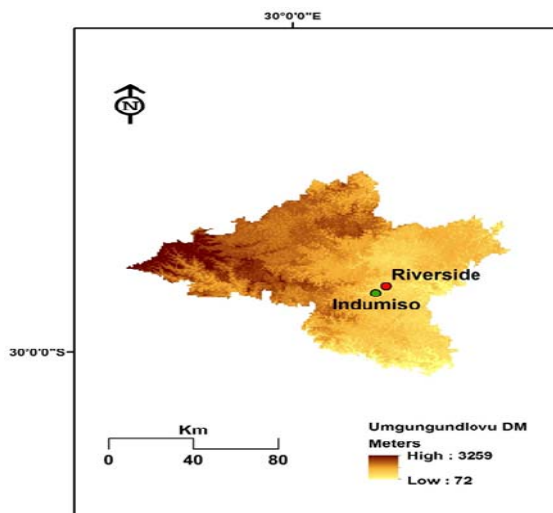


Fig. 3. DUT PMB campuses in uMgungundlovu District Municipality

According to the Council on Higher Education (2014) DUT is third from the leading Cape Peninsula University of Technology (CPUT) by enrolments among the Universities of Technology, following in second place is Tshwane University of Technology (TUT). According to (National Planning Commission, 2013), the NDP in the tertiary institutions of higher learning is aimed, by 2030, to improve the quality of education, training and innovation, by providing an expanding higher education sector that is able to raise income, increase productivity and promote recognizable depth in the knowledge economy.

2. Methodology

A quantitative analysis of the data of registered BTech students over the academic periods 2004 to

2014 is performed taking into account the number of qualifications offered by the respective departments in their faculties. The graduate students in the cohort of the BTech pool of incubation are denoted by BTech. The lists of qualifications and their departments are in the appendix Table 3, Table 5, Table 7, Table 10, Table 12 and Table 15.

2.1. Methods. *2.1.1. Data selection.* The data was received from the DUT ITSS 2014 database. The retrieved data files were for 2003 till 2014 BTech registered and graduating students with their contact details. The span of the data is 10 years. The total sample of the data is 21084. The numbers of registered BTech students are shown in Table 4 yearly, in the categories of full-time/part-time and ethnic groups. The data is collected in yearly samples. The

data of registered students in each year in the span of ten years is in Table 4. Figure 4 (see in Appendix) shows the numbers of registered students which steadily increases yearly.

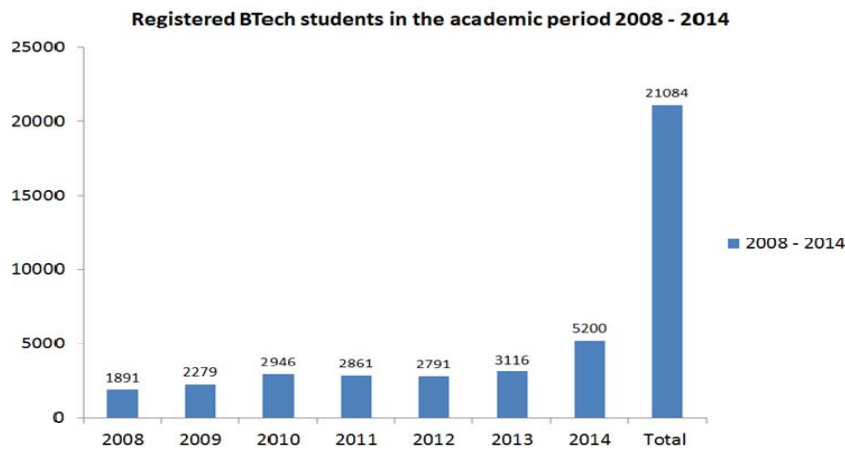


Fig. 4. The numbers of the registered BTECH students in the academic period

The categories of the collected data are full-time & part-time in the Durban (DBN), Pietermaritzburg (PMB) and Indumiso (IND) campuses as shown in Figure 5.

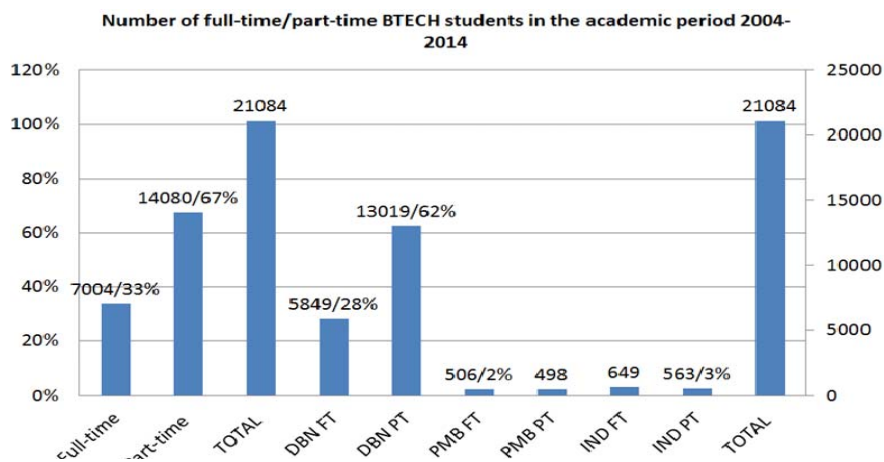


Fig. 6. The numbers of full-time/part-time BTECH students in the Durban, PMB and the Indumiso campuses

Table 1. The numbers of registered BTECH students yearly, in the categories of full-time/part-time and the ethnic groups

Reg. year 2003-2014	BTECH students
2004	0
2005	0
2006	0
2007	0
2008	1891
2009	2279
2010	2946
2011	2861
2012	2791
2013	3116
2014	5200
Total	21084

Full/part-time	Students
Full-time	7004
Part-time	14080
Total	21084
DBN FT	5849
DBN PT	13019
PMB FT	506
PMB PT	498
IND FT	649
IND PT	563
Total	21084

Ethnic	Students	Rate
African	15106	71.65%
Indian	4161	19.74%
Coloured	384	1.82%
White	1393	6.61%
Other	40	0.19%
Total	21084	100%

2.1.2. Quantitative measures. Qualifications' graduates frequency. The number of graduates of the academic year enrolments for the qualification is denoted by Ng. The progress of the qualification in the aca-

demical year is determined by the qualifications' graduates frequency and denoted by Qgf as the Ng weighted total number of faculty graduates. The overall qualification graduates frequency is denoted by Ogf.

Overall graduates' frequency. The Ogf depicts the progress of the qualification over the academic period which is the aggregate qualification graduates' frequency. The graduation rates in the academic period are the qualifications graduates' frequencies for each academic year. The frequency percentages of the qualifications' graduates are presented in the charts along the vertical axis and along the horizontal axis are the numbers of graduates in each academic year. The last column shows the overall frequencies of each qualification.

Popularity rate. The success of the qualifications is depicted by the high rates of the overall qualifica-

tion graduates' frequency which indicates the popularity of the qualification by the high number of graduates. The qualification popularity rate in the faculty is the Ogf weighted by the average of the total number of graduates in the faculty.

3. The faculties

3.1. Arts & Design faculty. The BTech graduates enrolled in ten of the qualifications which are offered in the seven departments in the faculty. Fig. 6 shows the qualifications graduates frequencies, Qgf, and the overall frequencies for the academic period.

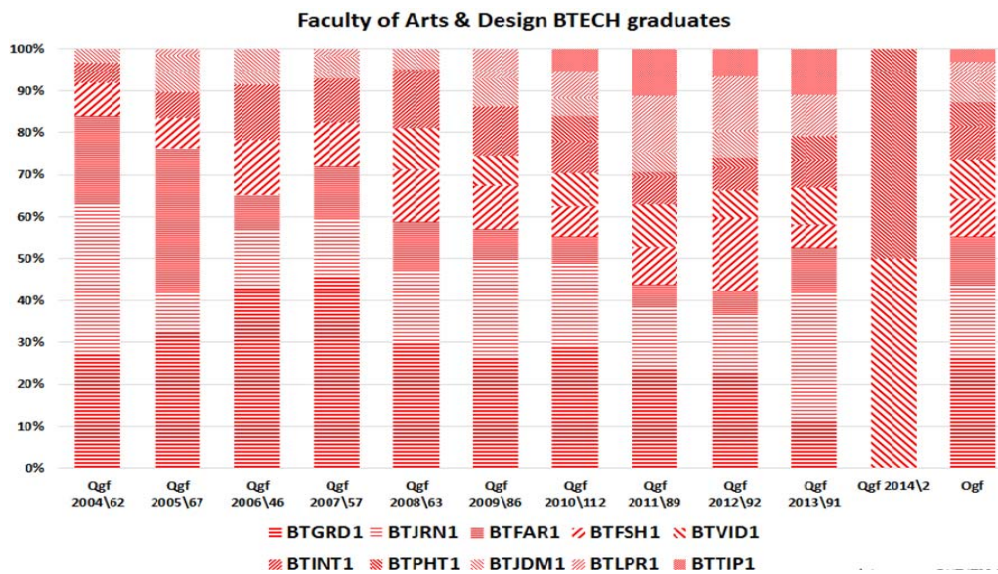


Fig. 6. Qualifications' graduates and frequencies in the faculty of Arts & Design

The numbers and frequencies are shown in the appendix Table 3. The seven departments in the faculty are Drama and Production Studies, Fashion and Textiles, Fine Arts and Jewellery Design, Media language and communications, School of Education, Video Technology and Visual Communication Arts & Design (2013). The faculty's graduates numbers Ng for the qualifications enrolled in the academic period is shown in the Appendix Table 4.

The chart depicts the trends of graduates in each of the qualifications. The most BTech students in the faculty qualified in the Graphic Design (BTGRD1) and Journalism (BTJRN1) qualifications. The highest Qgf in the BTGRD1 qualification was 45.6% in the academic year 2007 out of 57 graduates in the faculty beginning from the Qgf of 27.4% in 2004 out of 65 graduates in the qualification. The Ogf over the academic period which was the highest for all the qualifications is 26.6% for the Graphic Design qualification.

The trend of the number of graduates in the Graphic Design qualification increased from the Ng of 17 in the academic year 2004 to 26 in the academic year

2004 which then after steadily declined. The highest Qgf in the Journalism qualification was 35.5% with 22 out of the total number of graduates of 62 at the beginning of the academic period which then dropped and gradually increases. The increased Ng's (the number of graduates of the academic year enrolments for the qualification) in the faculty noted in the year 2009 and 2010 has enhanced the dropping numbers of graduates in the BTJRN1 qualification to 20 out of the total of 89 and to 28 out of the total of 112 respectively.

The dropping number of graduates in the considered academic period was noted to increase to the highest number of 28 graduates in 2013 out of the total of 91 graduates then to zero graduates in the year 2014. The overall graduate rate for the journalism qualification was 16.6% following the most enrolled Graphic Design qualification in the faculty. The Ng's in the Fashion qualification depicted a very low increment from the minimum of 5 in 2005 to the maximum of 16 in year 2012. The other qualifications in the faculty of Arts and Design had minimum Ng's at the Qgf's and Ogf's below 10% which included the Fashion qualification. The successful

qualification in the Faculty of Arts & Design was the Graphic Design and the least popular qualification was the Translation & Interpreting Practise in the Media Language and Communication.

3.2. Accounting & Informatics faculty. The trends of the numbers of graduates for the qualifications in the faculty of Accounting & Informatics are depicted in Figure 7.

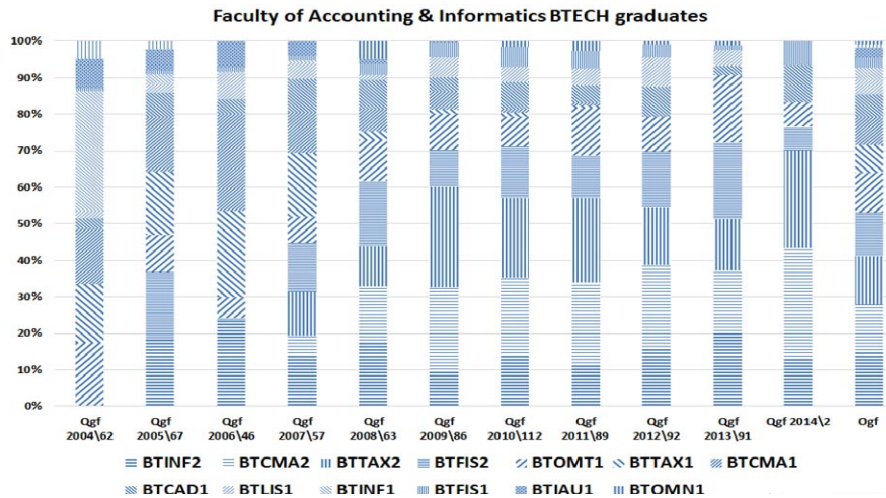


Fig. 7. Qualifications' graduates and frequencies in the Accounting & Informatics faculty

The frequencies of the qualifications and aggregate frequencies of the qualifications and the numbers of graduates are Table 4 in the Appendix. In the Accounting & Informatics faculty BTEch students graduated from the six departments which are, Taxation and Auditing, Finance and Information Management (Midlands), Financial Accounting, Information and Corporate Management, Information Technology and Management Accounting (Accounting & Informatics, 2013).

The totals of Ng's in the faculty increased starting from 142 to a maximum of 367 in year 2013 and towards the end of the academic period a total of 30 graduates qualified for the year 2014. The highest number of BTEch graduates was in the Information technology qualification. The academic period started with the maximum of 49 graduates in the BTINF1

and in 2005 the trend declined to 40 graduates for the qualification BTINF2 which towards the end of the period in 2013 increased to 73 resulting in the maximum Ogf of 15%. The other qualifications of the high Ogf's of 14.3% and 13.8% were Cost and Management Accounting and Taxation with maximum Ng's of 64 and 59, respectively for the year 2013 and 2011. The qualifications with the least Ogf's were Internal Auditing and Office Management Technology with the respective values of 2.8% and 1%.

The popular qualification in the Faculty of Accounting & Informatics was the Information Technology 2 which was introduced in 2005 and the least popular was Office Management and Technology.

3.3. Health Sciences faculty. Out of the ten departments in the faculty, BTEch graduates graduated in seven departments.

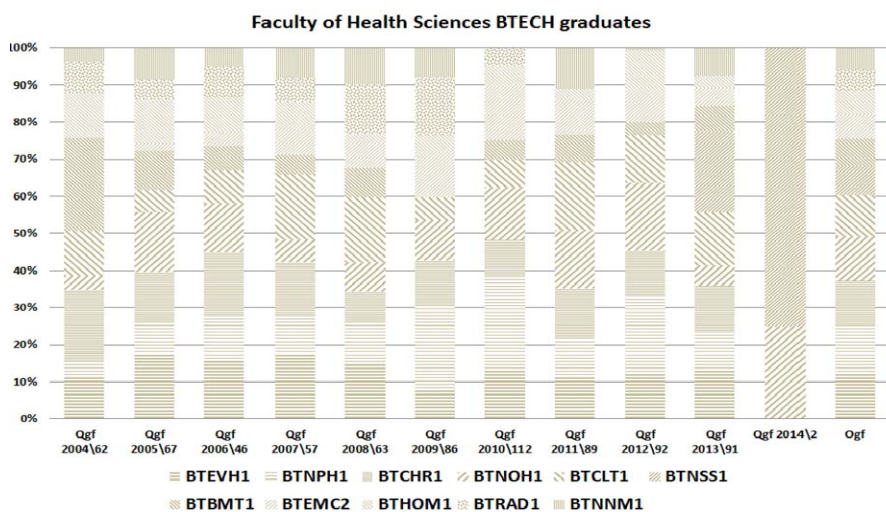


Fig. 8. Qualifications' graduates and frequencies in the Health Sciences faculty

The departments are Biomed & Clinical Technology, Chiropractic and Somatology, Community Health Studies, Emergency Medical Care & Rescue, Homeopathy, Nursing, Radiography (Health Sciences, 2013). There were no graduates from Dental Sciences, Medi-

cal Orthotics, Prosthetics, and Basic Medical Sciences. Over the academic period, BTech graduates in the faculty of Health Sciences qualified in 17 qualifications. The Ng's ranged from the minimum of five to the maximum of 279 as shown in Figures 8 and 9.

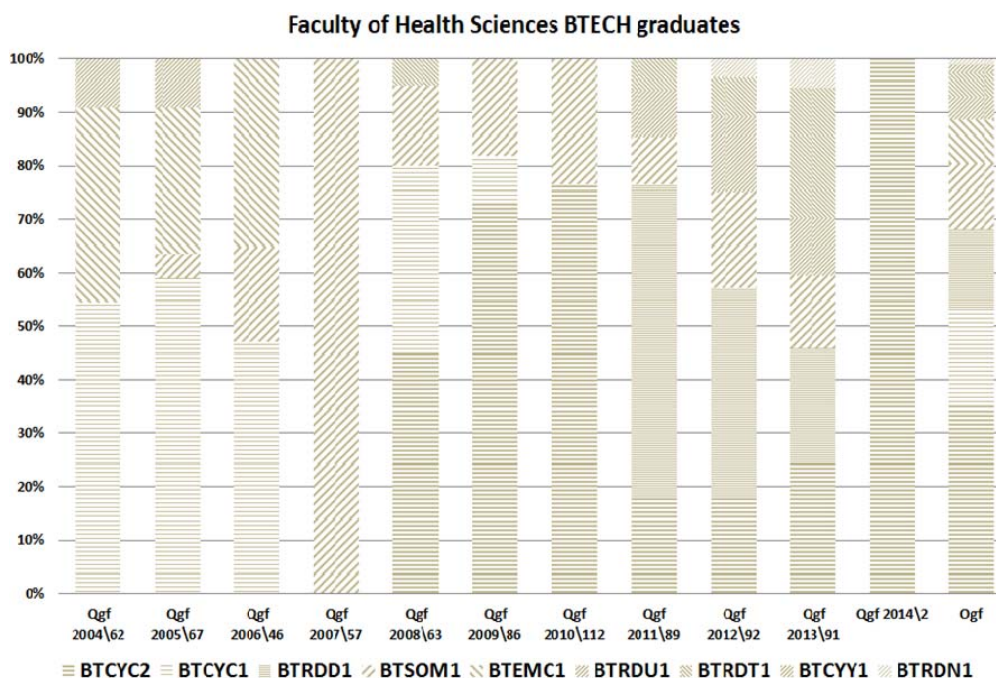


Fig. 9. Qualifications' graduates and frequencies in the Health Sciences faculty

The Ng's, the frequencies and aggregate frequencies of the qualification are in Table 8 and Table 9 in the Appendix. The Ng's for the Environmental health qualification, which is the qualification with the highest overall graduates' rate at the Qgf of 11.1%, ranged low from 15 to 31. The qualification with the overall graduates' frequency of 11% was the BTNPH1 qualification. The Ng's increased from five in 2004 to the maximum of 53 in 2010. Most graduates in the faculty graduated in the BTCHR1 qualification with 26 graduates in year 2004 at the Qgf of 18.2% which is the second maximum frequency in the academic period. In this qualification Ng's ranged mostly above 20 to the maximum of 31 in 2013. The Ogf for this qualification was 10.9% which is the third highest in the faculty. The following qualification with Ogf above 10% was the BTNOH1 at 10.8%. The highest Ng in this qualification over the academic period was 30 in the year 2012 at the Qgf of 15.3%.

Other qualifications with least Ng's and Qgf's respectively below 10 and 5% are shown in Figure 9 for the Faculty of Health Sciences. The qualification with Ogf's below 10% was the BTCLT1 with a high Ng's particularly for the year 2007 and 2013. The

qualification with the highest Ng towards the end of the academic period was the BTNSS1, where initially no graduates qualified.

Towards the end of the academic period 52 graduates qualified in the year 2013 at the Qgf of 21%. The qualification with an Ogf below 10% was the BTBMT1, in which the maximum of 33 Ng graduated at the beginning of the academic period. The Ogf of this qualification was 6.4%. The Ng's of the BTEMC2 qualifications with the Ogf of 5.6% were considerably high at the values of 20, 33 and 31 in the mid of the academic period. The qualification which had the least Ogf was Nursing Management at 5.1%. The popular qualifications were Environmental Health and Nursing Primary Health Care and the least popular qualification was Radiography: Nuclear Medicine.

3.4. Applied Sciences faculty. The eight departments in the Faculty of Applied Sciences are Biotechnology and Food Technology, Chemistry, Clothing and Textile Studies, Food and Nutrition Consumer Science, Horticulture, Maritime Studies, Mathematics, Statistics and Physics and Sport Studies (Applied Sciences, 2013).

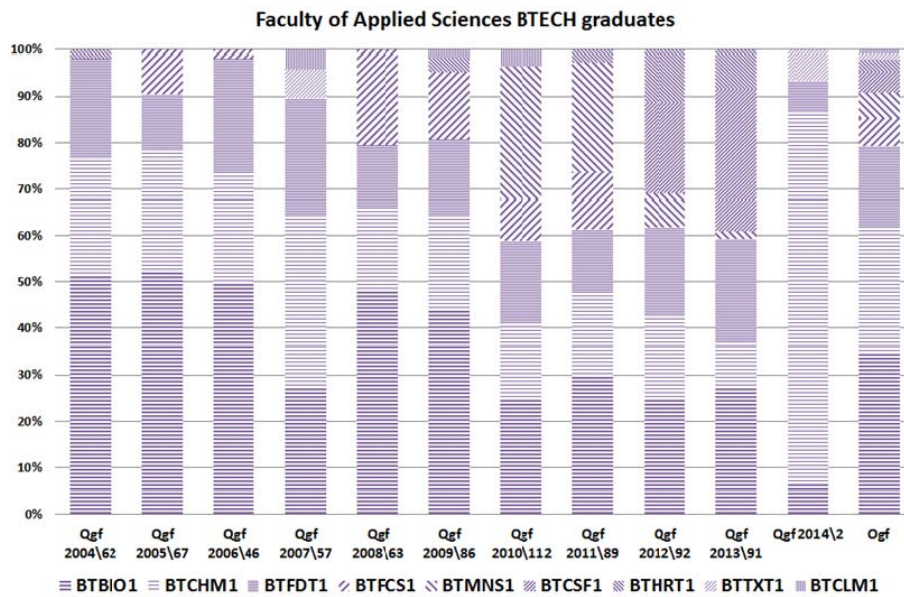


Fig. 10. Qualifications' graduates and frequencies in the Applied Sciences faculty

The BTech graduates over the academic period of 10 years graduated in the seven departments excluding the Maritime department. The Ogfs are shown in Figure 10. The chart depicts an erratic progress in the incubation of scientists over the academic period.

Table 1 in the Appendix shows the Ng's and the frequencies of the qualifications. The Ng's over the academic period have dropped varying to the low of 16 from the initial Ng of 55 ranging to a maximum of 100. About half of the Ng in the faculty during the academic year 2005 graduated in Biotechnology qualification. The Ng's varied throughout the academic period to the maximum of 28 in year 2006 and to the minimum of one in year 2014. The high Ng's of this qualification declined gradually over the academic period resulting in the Ogf of 35%.

The other two qualifications with high Ogf's were Chemistry and Food Technology at 26.8% and 17.4%, respectively. The maximum Ng for these qualifications was 18 and 15 for the Chemistry and Food Technology qualifications respectively. Other qualifications with Ogf below 10% include the Management Sports option, Consumer Science: Food and Nutrition at the maximum Qgf of 20.5% in year 2008, and Food and Consumer Sciences at the maximum Qgf of 30.5% in year 2013. The qualifications with the minimum overall graduates with the Qgf's below 2% were in the Clothing and Textile Studies Department. The faculty's popular qualifications were Biotechnology and Chemistry. The least popular qualification was Clothing Management: Clothing and Textile Studies.

3.5. Engineering and the Built Environment faculty. The graduates in the Faculty of Engineering and the Built Environment graduated in 25 qualifications

offered in the 10 departments exclusive of the Urban Futures Centre (Engineering & The Built Environment, 2013). Figure 11 depicts the trends of graduates in the frequencies of the qualifications and the numbers are shown in the appendix Table 13.

The Ng's in Engineering ranged from the minimum of 174 to a maximum of 420, which was a considerable indication of the growth in the human capacity development expertise for the high-technical fields. The high numbers of graduates qualified in the Civil, Electrical Heavy Current and in Chemical Engineering qualifications with the Ogf's of 18.2%, 13.3% and 12.9%, respectively. The trend of the Ng's in the Electrical Engineering: Heavy Current was interpreted to be indicative of increasing expertise, however, the numbers of graduates were varying with high numbers in other qualifications such as the Chemical, Quantity Surveying and Industrial Engineering. Among the qualifications in Civil Engineering with less graduates were Construction Management, Structural Engineering, Transportation, Urban Engineering and Water Engineering.

The Engineering: Electrical qualifications in the discipline of Communications, Computer Systems and Instrumentations under Electronic Engineering had low Ng's below 10, with the Ogf's below 1% as shown in the Figure 11. In the academic period from 2004 to 2007 for the qualifications with the Ogf's below 2%, no Qgf's were calculated out of the faculty graduates' totals of 179 (2004-2005), 179 (2005-2006) and 224 (2006-2007) because the numbers were very small and in some qualifications there were no graduates. In the academic period from 2008 to 2010 low numbers qualified from the Civil Engineering Midlands department.

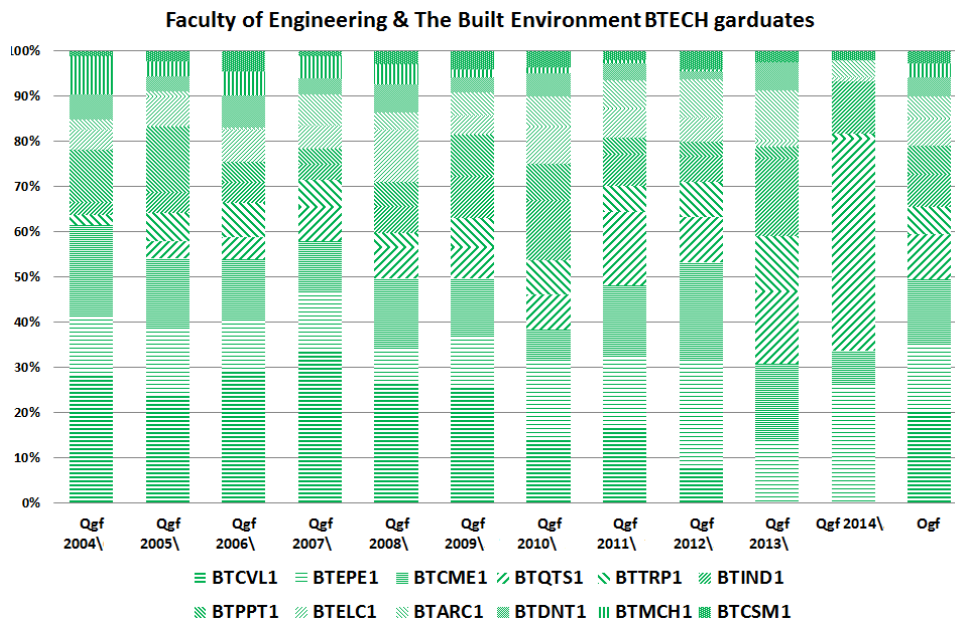


Fig. 9. Qualifications' graduates and frequencies in Engineering & the Built Environment

The popular qualifications in the Faculty of Engineering and the Built Environment were Engineering Civil and Engineering Electrical: Heavy Current. The popularity rate of the BTCVL1 was 4.83% and the least popular qualification was Engineering

Electrical and Computer Systems. The high numbers and low numbers in the other disciplines in Civil Engineering are indicative of the sustainable expertise with the potential to further develop in dealing with the infrastructure.

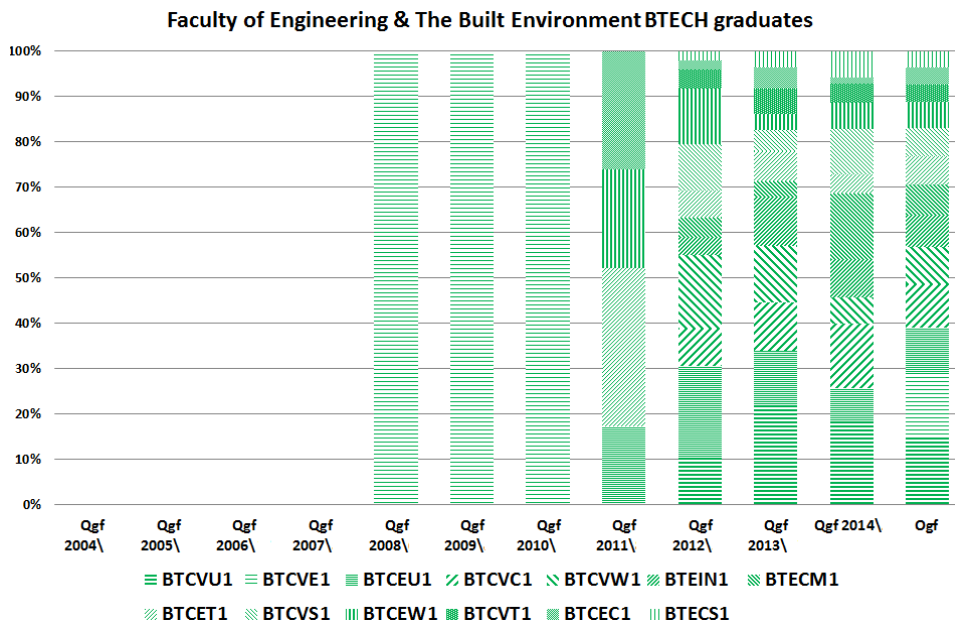


Fig. 12. Qualifications' graduates and frequencies in the Engineering & the Built Environment faculty

3.6. Management Sciences faculty. In the faculty of Management Sciences the BTECH graduates qualified from 25 qualifications offered in the 12 departments. Figure 13 and Figure 14 depict a strong growth in the progress of the incubation for the expertise in the Management Sciences. The Ng's, the frequencies and the aggregate frequencies of the qualifications are in Table 16 in the appendix, The Ng's in the faculty of Management Sciences were the highest out of all the faculties.

The Ng's ranged from the minimum of 137 to the maximum of 727 over the academic period. The qualification with the high Ng's in almost all qualifications enrolled was the Management qualification in the Business Studies Unit. In the beginning of the academic period a high Ng of 146 qualified at the Qgf of 50%. Other qualifications in the beginning of the period had Qgf of about 10% and below. The Ogf for the BTMBA1 was 36.4% where the Ng's were mostly above 100.

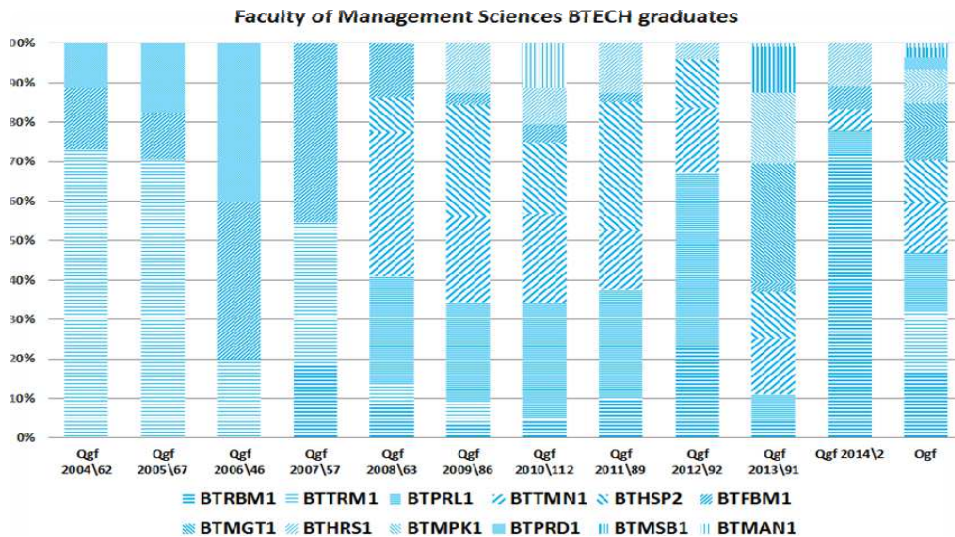


Fig. 13. Qualifications' graduates and frequencies in the Management Sciences faculty

Figure 14 shows the frequencies of the graduates for the qualifications with the overall qualification frequencies below 1.5%. Among the qualifications of low Ogf's was the Retail Business Management at 1.3%. The Tourism Management and the Public Relations Management qualifications had low Ng's with the Ogf's of 1.2% and 1.1% respectively. The

other qualifications had the Ogf's of 1% and below with significantly low Ng's including the Management (SAB) and the Management in the Applied Management (Midlands). The Ng's of the qualifications in the respective faculties show a positive but not stable progress of the incubation of BTech students.

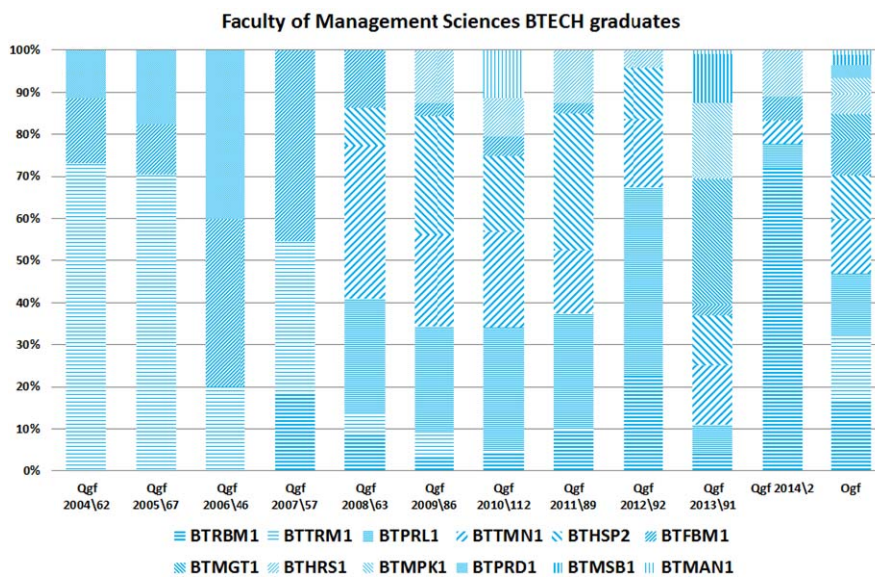


Fig. 14. Qualifications' graduates and frequencies in the Management Sciences faculty

4. Results

4.1. Discussion. The quantitative analysis of the enrolments in the BTech by gender shows a closely balanced gender, where males are slightly above at 52% as shown in Figure 15. The enrolments with 'Dr' titles were about 0.05%. Demographically, a low 3% of the graduates were from outside South Africa (see Figure 17). The second objective was to assess the mode of enrolments (part time/full time) in order to correlate the participation rates, the ethnic groups and the demographic factor with the graduation rates. The high enrolments are for

Part-time students at 67% (see Figure 5 and Table 1). The campus with the high part-time enrolments was the Durban campus with 62%. The low part-time enrolments were slightly below the full time enrolments in the Pietermaritzburg campus and Indumiso campus at 2% and 3%, respectively as shown in Table 1. The participation rate as the number of students between the ages of 20 to 24 years old weighted by the total number of graduates was found to be very low at 7%. This indicated a lack of progression of students after completing diplomas.

The third objective was to evaluate the throughput rate for the incubation over the graduation years. The throughput rate as the number of graduates in the academic period weighted by the total number of registered students was found to be 62%. The overall qualification frequencies for the most popular qualifications with the highest numbers of graduates are 36.4% for Management (see Table 16) in 25 qualifications, 35.0% for Biotechnology (see Table 11) in nine qualifications, 18% for Civil Engineering (see Table 13) in 25 qualifications, 26.6% for the Graphics and Design (see Table 4) in ten qualifications and 15.2% for the Information Technology in 14 qualifications.

4.2. Scaling. The scaling of the qualifications in the faculties according to the popularity rate of the most successful qualification was calibrated. The scale is computed using the popularity formula given by equation (1) to determine the qualifications graduates weighted overall rate.

The computations of the popularity rate are defined by the following quantification setting: P_{Q^i} : Popularity rate of the qualification in each faculty, T_{Q^i} :

Total number of qualifications in each faculty, $OQ_{H^{faculty}}$: Highest Overall Qualification frequency in the faculty, $n = 6$: Number of faculties, N_{gQ} : Number of graduates for the qualification, $Av[\cdot]$: Arithmetic mean function, \max_j : Maximum function,

$$P_{Q^i} = OQ_{H^{faculty}} \left(\frac{T_{Q^i}}{\sum_{j=1}^n T_{Q^j}} \right) \left(\frac{Av[N_{gQ}]}{\max_j Av[N_{gQ}]} \right). \quad (1)$$

The computed scale of popularity ranges from below one percent to 8.38% as shown in Table 2. The highest scale was in the Management Sciences, the scale in the Engineering and the Built Environment was about a third of the Management Sciences' scale. Ranging below a percent are scales of 0.93% in the Accounting & Informatics, 0.88% in the Health Sciences, 0.42% in the Arts & Design and 0.37% in the Applied Sciences.

Table 2. The scale of popularity for the qualifications in the six faculties

Faculty	Oqf_H	Oqf_L	Av[Ng]	T_Q	Success_rate	Ng_ratio	Popularity rate
Management Sciences	0.36	0.001	473.8	473.8	0.09	1.00	8.83%
Engineering & The Built Environment	0.18	0.004	292	292	0.04	0.62	2.72%
Accounting & Informatics	0.15	0.010	213.2	213.2	0.02	0.45	0.93%
Health Sciences	0.11	0.001	193.5	193.5	0.02	0.41	0.88%
Arts & Design	0.27	0.031	76.5	76.5	0.03	0.16	0.42%
Applied Sciences	0.35	0.009	57.4	57.4	0.03	0.12	0.37%

The Management Sciences faculty according to our analysis was found to lead in terms of enrolments and graduates. The least scaled faculty was Applied Sciences as a result of the minimum numbers of the enrolled qualifications and the average of graduates in the academic period. Moreover, the overall graduates' qualification frequency was among the highest at 0.35. The scale figure is the indication of fewer scientists being developed in the incubation of the pool of BTech students which is a very crucial effort in attaining the targeted demands in the higher education sector to deliver the economic priorities in the sustainability of the South African economy along the green growth developments initiatives.

Conclusion

The incubation of the critical mass of potential post-graduates at the Durban University of Technology was analyzed over the academic periods 2004 to

2014. The steady erratic strong growth progress for the expertise required in science, engineering and technology was realized over this academic period. The analysis focused on the pool of BTech graduates in the six faculties which showed Management Sciences and the Engineering and the Built Environment to have a lead in the strong growth of expertise. Demographically, the low percentage of graduates was from outside South Africa. The mode of study in the enrolments was highly part time and the enrolments by gender were slightly led by males. The low participation rate and the high part time enrolments are indications of the high enrolments from the working class aged 25 years and above.

The pool of BTech graduates has significantly high throughput rates. However, to engage on the 'cultivation of success' the throughput rate stands a potential chance to be improved by critically implementing evaluation measures to monitor the success

factors through peer groups in postgraduate studies. The cultivation has to support full-time enrolments and progression learning toward postgraduate higher degrees.

It is essential to orientate scarce skills and promote enrolments in the high demand skills and into the critical skills sufficiently to scale the benefits of the green economy from the brown economy as outlined by (Msweli, 2014). The incubation of potential post-graduates provides the technology niche to facilitate the 'green practice' which aims to practically engage on the development and in design for the change that is beneficial to both humans and the environment. This is firmly done by practising to value, to resource, and to master the creation processes through historic growth models involved in order to control the bio-activities technologically from the bio-resources at their sourced scales, so to resolve the

perplexing challenging problems of energy and natural resources (Vazquez-Brust et al., 2014).

Finally we have shown that the University contributes to producing the potential pool of postgraduate candidates but this pool needs to be tapped into and encouraged to take up postgraduate degrees in order to add to filling the skills gap within South Africa.

Acknowledgements

I thank Professor Msweli for her recompensing comments in research. I am grateful to Professor Moyo for the support towards this research. I appreciate and thank both the co-authors, Professor Moyo and Dr Dzwauro, for the work put forward towards this article right from the Green Economy & Development 1st International Conference 2014 at Makaranga. I thank the staff at Research and Postgraduate Support for the cooperation.

References

1. Accounting & Informatics (2013). Faculty of Accounting & Informatics. [Online] Available at: http://www.dut.ac.za/faculty/accounting_and_informatics/ [Accessed 3 November 2014].
2. Applied Sciences (2013). Faculty of Applied Sciences. [Online] Available at: http://www.dut.ac.za/faculty/applied_sciences/ [Accessed November 3, 2014].
3. Arts & Design (2013). Faculty of Arts & Design. [Online] Available at: http://www.dut.ac.za/faculty/arts_and_design/. [Accessed 05 November 2014].
4. Barbier, E., Pearce, D. & Markandya, A. (1989). *Blueprint for a green economy*. London: Earthscan publications Limited.
5. Bartelmus, P. (2013). The future we want: Green growth or sustainable development? *Environmental Development*, pp. 165-170. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S2211464513000341>.
6. Chule, S., Dzwauro, B. & Moyo, S. (2014). *Sustainable Postgraduate Development Through Incubation of Critical Mass at Durban University of Technology*. Durban, Green Publications.
7. Council on Higher Education (2014). *VitalStas: Public Higher Education 2012*. [Online] Available at: http://www.che.ac.za/sites/default/files/publications/VitalStats%202012%20Web_0.pdf.
8. David, P. & Lopez, J. (2001). Knowledge, capabilities and human capital formation in economic growth. Unpublished research report prepared for the New Zealand Treasury. [Online] Available at: <http://www.treasury.govt.nz/publications/research-policy/wp/2001/01-13/twp01-13.pdf>.
9. Division of Corporate Affairs (2008). *Hundredth years of wisdom*, Durban: University publications and archives. [Online] Available at: http://www.dut.ac.za/wp-content/uploads/menu/DUT_100.pdf.
10. Durban University of Technology (2013). *Vision and Mission*. [Online] Available at: <http://www.dut.ac.za/vision/>. [Accessed 1 January 2015].
11. Elliott, D., Biller, P., Schmidt, A. & Jones, S. (2015). Hydrothermal Liquefaction of biomass: Developments from batch to continuous process. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S0960852414013911>.
12. Engineering & The Built Environment (2013). Faculty of Engineering & The Built Environment. [Online] Available at: <http://www.dut.ac.za/faculty/engineering/>. [Accessed 3 November 2014].
13. Health Sciences (2013). Faculty Of Health Sciences. [Online] Available at: http://www.dut.ac.za/faculty/health_sciences/. [Accessed 3 November 2014].
14. Jouvét, P.-A. & De Perthuis, C. (2013). Green growth: From intention to implementation, *International Economics*, pp. 29-55. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S2110701713000103>.
15. Management Sciences (2013). Faculty of Management Sciences. [Online] Available at: <http://www.dut.ac.za/faculty/management>. [Accessed 5 November 2014].
16. Msweli, P. (2014). *How to change the complexion of the economy from brown to green? A case of South Africa*. Durban, Green publications.
17. Musango, J., Bassi, A. & Brent, A. (2014). Modelling the transition towards a green economy in South Africa. Volume 87, pp. 257-273. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S0040162514000031>.
18. Nafukho, F.M., Hairston, N. & Brooks, K. (2004). Human capital theory: Implications for human resource development, *Human Resource Development International*, 7 (4), pp. 545-551. [Online] Available at: <http://www.tandfonline.com/doi/pdf/10.1080/1367886042000299843>.

19. National Planning Commission (2013). National Development Plan Vision 2030 [Online]. Available at: <http://www.education.gov.za>.
20. Obamba, M. (2013). Uncommon Knowledge: World Bank Policy and the Unmaking of the Knowledge Economy in Africa, *Higher Education Policy*, Volume 26, pp. 83-108. [Online] Available at: <http://www.palgrave-journals.com/hep/journal/v26/n1/pdf/hep201220a.pdf>.
21. Quarrie, J. (1992). *Earth Summit' 92: The United Nations Conference on Environment and Development*. Rio de Janeiro 1992.
22. Research and Postgraduate Support Directorate (2015). [Online] Available at: <http://dutstudent.dut.ac.za/Postgraduate%20Development%20and%20Support/POSTGRADUATE%20STUDENT%20GUIDE%202015.pdf>.
23. Richard, P. & James, G. (2000). Intellectual capital literature review, *Journal of Intellectual Capital*, 1(2), pp. 155-176. [Online]. Available at: <http://www.emeraldinsight.com/doi/pdfplus/10.1108/14691930010348731>.
24. Romer, P.M. (1987). Growth based on increasing returns due to specialization, *The American Economic Review*, pp. 56-62. [Online]. Available at: http://www.development.wne.uw.edu.pl/uploads/Courses/gtac_romer_87.pdf.
25. Schmalensee, R. (2012). From “Green Growth” to sound policies: An overview, *Energy Economics*, 34 (Supplement 1), pp. S2-S6. [Online]. Available at: <http://www.sciencedirect.com/science/article/pii/S0140988312002113#>.
26. Turner, D. (2012). Higher education: Centre stage or in the wings of the knowledge economy – A review essay. *International Journal of Educational Development*, 32(6), pp. 835-837. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S0738059312000259>.
27. UN Conference on Sustainable Development (2012). Current ideas on sustainable development goals and indicators. Rio 2012. [Online] Available at: http://www.uncsd2012.org/content/documents/218Issues%20Brief%206%20-%20SDGs%20and%20Indicators_Final%20Final%20clean.pdf.
28. van der Ploeg, R. & Withagen, C. (2013). Green Growth, Green Paradox and the global economic crisis, *Environmental Innovation and Societal Transitions*, Volume 6, pp. 116-119. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S2210422412000573>.
29. Vazquez-Brust, D., Smith, A.M. & Sarkis, J. (2014). Managing the transition to critical green growth: The ‘Green Growth State’. *Futures*, Volume 64, pp. 38-50. [Online] Available at: <http://www.sciencedirect.com/science/article/pii/S0016328714001669>.
30. Von Frantzius, I. (2004). World Summit on Sustainable Development Johannesburg 2002: A critical analysis and assessment of the outcomes, *Environmental Politics*, 13(2), pp. 467-473. [Online] Available at: <http://www.tandfonline.com/doi/pdf/10.1080/09644010410001689214>.
31. Wynberg, R. (2002). A decade of biodiversity conservation and use in South Africa: tracking progress from the Rio Earth Summit to the Johannesburg World Summit on Sustainable Development: review article, *South African Journal of Science*, 98 (5 & 6), pp. 233-243. [Online] Available at: http://reference.sabinet.co.za/webx/access/electronic_journals/sajsci/sajsci_v98_n5_a10.pdf.

Appendices

A.1 Tables

Table 3. Qualifications codes, names and departments in the Arts & Design faculty

Qualification code	Qualification name	Department
BTFSH1	BT: Fashion	Fashion & Textiles
BTFAR1	BT: Fine Art	Fine Art & Jewellery Design
BTJDM1	BT: Jewellery Design and Manufacture	Fine Art & Jewellery Design
BTJRN1	BT: Journalism	Media language & Communication
BTLPR1	BT: Language Practice	Media language & Communication
BTTIP1	BT: Translation and Interpreting Practice	Media language & Communication
BTVID1	BT: Video Technology	Video Technology
BTGRD1	BT: Graphic Design	Visual Communication Design
BTINT1	BT: Interior Design	Visual Communication Design
BTRHT1	BT: Photography	Visual Communication Design

Table 4. Qualifications' numbers of graduates, frequencies and overall frequencies in the Arts & Design faculty

Qual. code	Year 04/62	Qgf 2004	Year 05/67	Qgf 2005	Year 06/46	Qgf 2006	Year 07/57	Qgf 2007	Year 08/63	Qgf 2008	Year 09/86	Qgf 2009	Year 10/112	Qgf 2010	Year 11/89	Qgf 2011	Year 12/92	Qgf 2012	Year 13/91	Qgf 2013	Year 14/2	Qgf 2014	Qgf
BTGRD1	17	27.4%	22	32.8%	20	43.5%	26	45.6%	19	30.2%	23	26.7%	32	28.5%	21	23.6%	21	22.8%	10	11.0%	0	0.0%	26.6%
BTJRN1	22	35.5%	6	9.8%	6	13.0%	8	14.0%	11	17.5%	20	23.3%	23	20.5%	13	14.6%	13	14.1%	28	30.8%	0	0.0%	17.5%
BTFAR1	13	21.0%	23	34.3%	4	8.7%	7	12.3%	7	11.1%	6	7.0%	7	6.3%	5	5.6%	5	5.4%	10	11.0%	0	0.0%	11.2%
BTFSH1	5	8.1%	5	7.5%	6	13.0%	6	10.5%	8	12.7%	9	10.5%	8	7.1%	8	9.0%	16	17.4%	5	5.5%	0	0.0%	9.2%
BTVID1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	6	9.5%	6	7.0%	9	8.0%	9	10.1%	6	6.5%	8	8.8%	1	50.0%	9.1%
BTINT1	3	4.8%	4	6.0%	6	13.0%	6	10.5%	9	14.3%	10	11.6%	8	7.1%	6	6.7%	5	5.4%	6	6.6%	0	0.0%	7.8%
BTPHT1	0	0.0%	0	0.0%	0	0.0%	0	10.5%	0	0.0%	0	0.0%	7	6.3%	1	1.1%	2	2.2%	5	5.5%	1	50.0%	5.9%
BTJDM1	2	3.2%	6	9.0%	4	8.7%	3	5.3%	3	4.8%	6	7.0%	5	4.5%	4	4.5%	6	6.5%	0	0.0%	0	0.0%	4.9%
BTLPR1	0	0.0%	1	1.5%	0	0.0%	1	1.8%	0	0.0%	6	7.0%	7	6.3%	12	13.5%	12	13.0%	9	9.9%	0	0.0%	4.8%
BTTIP1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	6	5.4%	10	11.2%	6	6.5%	10	11.0	0	0.0%	3.1%

Table 5. Qualifications' codes, names and departments in the Accounting & Informatics faculty

Qualification code	Qualification name	Department
BTCAD1	BT: Corporate administration	Financial accounting
BTCMA1	BT: Cost and management accounting	Management accounting
BTCMA2	BT: Cost and management accounting	Management accounting
BTFIS1	BT: Financial information system	Information technology
BTFIS2	BT: Financial information system	Information technology
BTIAU1	BT: Internal auditing	Auditing and taxation
BTIAU2	BT: Internal auditing	Auditing and taxation
BTINF1	BT: Information technology	Information technology
BTINF2	BT: Information technology	Information technology
BTLIS1	BT: Library and information studies	Information & corporate management
BTOMN1	BT: Office management and technology	Finance & information management (Pietermaritzburg)
BTOMT1	BT: Office management and technology	Information & corporate management
BTTAX1	BT: Taxation	Auditing and taxation
BTTAX2	BT: Taxation	Auditing and taxation

Table 6. Qualifications' numbers of graduates, frequencies and overall frequencies in the Accounting & Informatics faculty

Qual. code	Year 04/142	Qgf 2004	Year 05/213	Qgf 2005	Year 06/157	Qgf 2006	Year 07/154	Qgf 2007	Year 08/162	Qgf 2008	Year 09/181	Qgf 2009	Year 10/278	Qgf 2010	Year 11/256	Qgf 2011	Year 12/222	Qgf 2012	Year 13/367	Qgf 2013	Year 14/30	Qgf 2014	Qgf
BTINF2	0	0.0%	40	28.2%	37	23.6%	21	13.6%	29	17.9%	18	9.9%	39	14.0%	30	11.7%	34	15.3%	73	19.9%	4	13.3%	15.2%
BTCMA2	0	0.0%	0	0.0%	0	0.0%	9	5.8%	24	14.8%	41	22.7%	59	21.2%	57	22.3%	52	23.4%	64	17.4%	9	30.0%	14.3%
BTTAX2	0	0.0%	0	0.0%	0	0.0%	18	11.7%	18	11.1%	51	27.6%	61	21.9%	59	23.0%	35	15.8%	51	13.9%	8	26.7%	13.8%
BTFIS2	0	0.0%	40	28.2%	1	0.6%	29	13.6%	29	17.9%	18	9.9%	39	14.0%	30	11.7%	34	15.3%	77	21.0%	2	6.7%	12.6%
BTOMT1	26	18.3%	22	15.5%	9	5.7%	18	7.1%	18	11.1%	18	9.9%	23	8.3%	33	12.9%	21	9.5%	68	18.5%	2	6.7%	11.2%
BTTAX1	24	16.9%	38	26.8%	37	23.6%	4	17.5%	4	2.5%	2	1.1%	3	1.1%	2	0.8%	0	0.0%	0	0.0%	0	0.0%	8.2%
BTCMA1	23	16.2%	32	22.5%	42	26.8%	10	11.0%	10	6.2%	9	5.0%	3	1.1%	2	0.8%	0	0.0%	0	0.0%	0	0.0%	8.1%
BTCAD1	4	2.8%	15	10.6%	6	3.8%	13	9.1%	13	8.0%	7	3.9%	20	7.2%	12	4.7%	18	8.1%	9	2.5%	3	10.0%	6.4%
BTUS1	3	2.1%	6	4.2%	11	7.0%	2	4.5%	2	1.2%	10	5.5%	12	4.3%	12	4.7%	18	8.1%	16	4.4%	0	0.0%	4.2%
BTINF1	49	34.5%	5	3.5%	1	0.6%	0	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.6%
BTFIS1	1	0.7%	2	1.4%	2	1.3%	5	1.3%	5	3.1%	7	3.9%	15	5.4%	12	4.7%	8	3.6%	5	1.4%	2	6.7%	3.0%
BTIAU1	12	8.5%	13	9.2%	11	7.0%	2	3.9%	2	1.2%	1	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2.8%
BTOMN1	0	0.0%	0	0.0%	0	0.0%	8	0.0%	8	4.9%	0	0.0%	4	1.4%	7	2.7%	2	0.9%	4	1.1%	0	0.0%	1.0%

Table 7. Qualifications' codes, names and departments in the Health Sciences faculty

Qualification code	Qualification name	Department
BTBMT1	BT: Biomedical technology	Biomed & clinical technology
BTCHR1	BT: Chiropractic	Chiropractic and somatology
BTCLT1	BT: Clinical technology	Biomed & clinical technology
BTCYC1	BT: Child and youth development (CYC)	Community health studies
BTCYC2	BT: Child and youth development (CYC)	Community health studies
BTCYY1	BT: Child and youth development (YW)	Community health studies
BTEMC1	BT: Emergency medical care	Emergency medical care & rescue
BTEMC2	BT: Emergency medical care	Emergency medical care & rescue
BTHOM1	BT: Homoeopathy	Homoeopathy
BTNNM1	BT: Nursing (Nursing management)	Nursing
BTNOH1	BT: Nursing (Occupational health)	Nursing

Table 8. Qualifications' numbers of graduates, frequencies and overall frequencies in the Health Sciences faculty

Qual. code	Year 04/143	Qgf 2004	Year 05/173	Qgf 2005	Year 06/153	Qgf 2006	Year 07/177	Qgf 2007	Year 08/171	Qgf 2008	Year 09/224	Qgf 2009	Year 10/226	Qgf 2010	Year 11/196	Qgf 2011	Year 12/193	Qgf 2012	Year 13/279	Qgf 2013	Year 14/5	Qgf 2014	Qgf
BTEVH1	15	10.5%	27	15.6%	21	13.7%	31	17.5%	23	13.5%	17	7.6%	28	12.4%	19	9.7%	20	10.4%	31	11.1%	0	0.0%	11.1%
BTNPH1	5	3.5%	12	6.9%	17	11.1%	17	9.6%	16	9.4%	48	21.4%	53	23.5%	16	8.2%	35	18.1%	25	9.0%	0	0.0%	11.0%
BTCHR1	26	18.2%	21	12.1%	23	15.0%	25	14.1%	13	7.6%	26	11.6%	20	8.8%	22	11.2%	20	10.4%	31	11.1%	0	0.0%	10.9%
BTNOH1	5	3.5%	24	13.9%	18	11.8%	11	6.2%	12	7.0%	23	10.3%	29	12.8%	25	12.8%	30	15.5%	13	4.7%	1	20.0%	10.8%
BTCLT1	16	11.2%	9	5.2%	12	7.8%	30	16.9%	26	15.2%	13	5.8%	16	7.1%	30	15.3%	21	10.9%	35	12.5%	0	0.0%	9.8%
BTNSS1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	52	18.6%	3	60.0%	7.1%
BTBMT1	33	23.1%	16	9.2%	9	5.9%	9	5.1%	12	7.0%	0	0.0%	11	4.9%	12	6.1%	6	3.1%	17	6.1%	0	0.0%	6.4%
BTEMC2	0	0.0%	3	1.7%	5	3.3%	14	7.9%	11	6.4%	27	12.1%	31	13.7%	16	8.2%	14	7.3%	12	4.3%	0	0.0%	5.9%
BTNOM1	16	11.2%	18	10.4%	13	8.5%	11	6.2%	3	1.8%	9	4.0%	11	4.9%	4	2.0%	18	9.3%	8	2.9%	0	0.0%	5.6%
BTRAD1	11	7.7%	8	4.6%	11	7.2%	11	6.2%	20	11.7%	33	14.7%	10	4.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5.1%
BTNNM1	5	3.5%	13	7.5%	7	4.6%	14	7.9%	15	8.8%	17	7.6%	0	0.0%	18	9.2%	1	0.5%	18	6.5%	0	0.0%	5.1%

Table 9. Qualifications' numbers of graduates, frequencies and overall frequencies in the Health Sciences faculty

Qual. code	Year 04/143	Qgf 2004	Year 05/173	Qgf 2005	Year 06/153	Qgf 2006	Year 07/177	Qgf 2007	Year 08/171	Qgf 2008	Year 09/224	Qgf 2009	Year 10/226	Qgf 2010	Year 11/196	Qgf 2011	Year 12/193	Qgf 2012	Year 13/279	Qgf 2013	Year 14/5	Qgf 2014	Qgf
BTCYC2	0	0.0%	0	0.0%	0	0.0%	0	0.0%	9	5.3%	8	3.6%	13	5.8%	6	3.1%	5	2.6%	9	3.2%	1	20.0%	4.0%
BTCYC1	6	4.2%	13	7.5%	8	5.2%	0	0.0%	7	4.1%	1	0.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2.0%
BTRDD1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	20	10.2%	11	5.7%	8	2.9%	0	0.0%	1.7%
BTSOM1	0	0.0%	1	0.6%	3	2.0%	4	2.3%	3	1.8%	2	0.9%	4	1.8%	3	1.5%	5	2.6%	5	1.8%	0	0.0%	1.4%
BTEMC1	4	2.8%	6	3.5%	6	3.9%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.9%
BTRUD1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	1.5%	4	2.1%	4	1.4%	0	0.0%	0.5%
BTRDT1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.6%	0	0.0%	0	0.0%	2	1.0%	2	1.0%	9	3.2%	0	0.0%	0.5%
BTCYY1	1	0.7%	2	1.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.2%
BTRD1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.5%	2	0.7%	0	0.0%	0.1%

Table 10. Qualifications' codes, names and departments in the Applied Sciences faculty

Qualification code	Qualification name	Department
BTBIO1	BT: Biotechnology	Biotechnology & food technology
BTPDT1	BT: Food technology	Biotechnology & food technology
BTCHM1	BT: Chemistry	Chemistry
BTCLM1	BT: Clothing management	Clothing & textile studies
BTTXT1	BT: Textile technology	Clothing & textile studies
BTCSF1	BT: Consumer science: food & nutrition	Food & nutrition consumer science
BTFCS1	BT: Food & consumer sciences	Food & nutrition consumer science
BTHRT1	BT: Horticulture	Horticulture
BTMNS1	BT: Management (Sport option)	Sport option

Table 11. Qualifications' numbers of graduates, frequencies and overall frequencies in the Applied Sciences faculty

Qual. code	Year 04/51	Qgf 2004	Year 05/42	Qgf 2005	Year 06/56	Qgf 2006	Year 07/48	Qgf 2007	Year 08/44	Qgf 2008	Year 09/62	Qgf 2009	Year 10/56	Qgf 2010	Year 11/75	Qgf 2011	Year 12/81	Qgf 2012	Year 13/59	Qgf 2013	Year 14/15	Qgf 2014	Qgf
BTBIO1	26	51.0%	22	52.4%	28	50.0%	13	27.1%	21	47.7%	27	43.5%	14	25.0%	22	29.3%	20	24.7%	16	27.1%	1	6.7%	35.0%
BTCHM1	13	25.5%	11	26.2%	13	23.2%	18	37.5%	8	18.2%	13	21.0%	9	16.1%	14	18.7%	15	18.5%	6	10.2%	12	80.0%	26.8%
BTFD1	11	21.6%	5	11.9%	14	1.8%	12	25.0%	6	13.6%	10	16.1%	10	17.9%	10	13.3%	15	18.5%	13	22%	1	6.7%	17.4%
BTCHM1	0	0.0%	4	0.0%	1	0.0%	0	0.0%	9	20.5%	9	14.5%	5	8.9%	9	12.0%	0	0.0%	0	0.0%	0	0.0%	6.1%
BTMNS1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	16	28.6%	18	24.0%	6	7.4%	1	1.7%	0	0.0%	5.6%
BTCSF1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	16	19.8%	18	30.5%	0	0.0%	4.6%
BTHRT1	0	2.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	3.2%	0	0.0%	2	2.7%	9	11.1%	5	8.5%	0	0.0%	2.5%
BTTXT1	1	0.0%	0	0.0%	0	0.0%	3	6.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	6.7%	1.2%
BTCLM1	0	0.0%	0	0.0%	0	0.0%	2	4.2%	0	0.0%	1	1.6%	2	3.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.9%

Table 10. Qualifications' codes, names and departments in the Applied Sciences faculty

Qualification code	Qualification name	Department
BTARC1	BT: Architectural technology	Architect technology
BTCEC1	BT: Engineering: civil (construct man)	Civil engineering (Midlands)
BT CET1	BT: Engineering: civil (transportation)	Civil engineering (Midlands)
BTCEU1	BT: Engineering: civil (urban eng)	Civil engineering (Midlands)
BTCEW1	BT: Engineering: (water eng)	Civil engineering (Midlands)
BTCME1	BT: Engineering: chemical	Chemical engineering
BTC SM1	BT: Engineering: management	Construction management & quantity surveying
BTCVC1	BT: Construction management	Civil engineering & surveying (Durban)
BTCVE1	BT: Engineering: civil (construct man)	Civil engineering (Midlands)
BTCVL1	BT: Engineering: civil	Civil engineering & surveying (Durban)
BTCVS1	BT: Engineering: civil	Civil engineering & surveying (Durban)
BTCVT1	BT: Engineering: civil (structural eng)	Civil engineering & surveying (Durban)
BTCVU1	BT: Engineering: civil (transportation)	Civil engineering & surveying (Durban)
BTCVW1	BT: Engineering: civil (urban eng)	Civil engineering & surveying (Durban)
BTECM1	BT: Engineering: civil (water eng)	Electronic surveying
BTECS1	BT: Engineering: electrical (comm)	Electronic surveying
BTEIN1	BT: Engineering: electrical (comp sys)	Electronic surveying
BTELC1	BT: Engineering: electrical (instr)	Electronic surveying
BTEPE1	BT: Engineering: electrical (l/c)	Electrical power engineering
BTIND1	BT: Engineering: electrical (h/c)	Industrial engineering
BTMCH1	BT: Engineering: industrial	Mechanical engineering
BTPPT1	BT: Engineering: mechanical	Chemical engineering
BTQTS1	BT: Pulp and paper technology	Construction management & quantity surveying
BTSUR1	BT: Surveying	Civil engineering & surveying (Durban)
BTTRP1	BT: Town & regional planning	Town & regional planning

Table 13. Qualifications' numbers of graduates, frequencies and overall frequencies in the Engineering & Built Environment faculty

Qual. code	Year 04/179	Qgf 2004	Year 05/179	Qgf 2005	Year 06/224	Qgf 2006	Year 07/250	Qgf 2007	Year 08/258	Qgf 2008	Year 09/361	Qgf 2009	Year 10/311	Qgf 2010	Year 11/368	Qgf 2011	Year 12/370	Qgf 2012	Year 13/420	Qgf 2013	Year 14/174	Qgf 2014	Qgf	
BTCVL1	51	28.5%	43	24.0%	65	29.0%	85	34.0%	65	25.2%	87	24.1%	40	12.9%	57	15.5%	26	7.0%	0	0.0%	0	0.0%	0	18.2%
BTEPE1	23	12.8%	26	14.5%	26	11.6%	31	12.4%	20	7.8%	40	11.1%	50	16.1%	56	15.2%	76	20.5%	35	8.3%	27	15.5%	13.3%	
BTCEM1	36	20.1%	28	15.6%	30	13.4%	29	11.6%	39	15.1%	43	11.9%	21	6.8%	53	14.4%	69	18.6%	43	10.2%	8	4.6%	12.9%	
BTQTS1	0	0.0%	7	3.9%	11	4.9%	19	7.6%	17	6.6%	24	6.6%	22	7.1%	56	15.2%	32	8.6%	40	9.5%	49	28.2%	8.9%	
BTTRP1	4	2.2%	11	6.1%	17	7.6%	15	6.0%	8	3.1%	22	6.1%	22	7.1%	20	5.4%	25	6.8%	31	7.4%	1	0.6%	5.3%	
BTIND1	5	2.8%	8	4.5%	10	4.5%	9	3.6%	14	5.4%	32	8.9%	38	12.2%	25	6.8%	19	5.1%	43	10.2%	12	6.9%	6.4%	
BTPPT1	21	11.7%	26	14.5%	10	4.5%	8	3.2%	14	5.4%	31	8.6%	23	7.4%	12	3.3%	10	2.7%	7	1.7%	0	0.0%	5.7%	
BTELC1	8	4.5%	12	6.7%	16	7.1%	19	5.2%	29	11.2%	14	3.9%	24	7.7%	22	6.0%	17	4.6%	3	0.7%	1	0.6%	5.3%	
BTARC1	4	2.2%	2	1.1%	1	0.4%	17	6.8%	9	3.5%	18	5.0%	19	6.1%	22	6.0%	27	7.3%	28	6.7%	4	2.3%	4.3%	
BDTNT1	10	5.6%	6	3.4%	16	7.1%	9	3.6%	16	6.2%	11	3.0%	15	4.8%	13	3.5%	6	1.6%	16	3.8%	0	0.0%	3.9%	
BTMCH1	15	8.4%	6	3.4%	12	5.4%	12	4.8%	11	4.3%	6	1.7%	4	1.3%	2	0.5%	1	0.3%	0	0.0%	0	0.0%	2.7%	
BTCSM1	2	1.1%	4	2.2%	10	4.5%	1	1.2%	7	2.7%	14	3.9%	10	3.2%	7	3.2%	13	3.5%	6	1.4%	2	1.1%	2.4%	

Table 14. Qualifications' numbers of graduates, frequencies and overall frequencies in the Engineering & Built Environment faculty

Qual. code	Year 04/179	Qgf 2004	Year 05/179	Qgf 2005	Year 06/224	Qgf 2006	Year 07/250	Qgf 2007	Year 08/258	Qgf 2008	Year 09/361	Qgf 2009	Year 10/311	Qgf 2010	Year 11/368	Qgf 2011	Year 12/370	Qgf 2012	Year 13/420	Qgf 2013	Year 14/174	Qgf 2014	Qgf
BTCVU1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	1.4%	37	8.8%	13	7.5%	1.6%
BTVE1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	9	3.5%	19	5.3%	23	7.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.5%
BTCEU1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	1.1%	10	2.7%	20	4.8%	5	2.9%	1.0%
BTCVC1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	1.1%	18	4.3%	10	5.7%	1.0%
BTCVW1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	8	2.2%	21	5.0%	4	2.3%	0.9%
BTEIN1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.5%	18	4.3%	6	3.4%	0.8%
BTECM1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.5%	6	1.4%	10	5.7%	0.7%
BTCET1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	8	2.2%	3	0.8%	11	2.6%	3	1.7%	0.7%
BTCVS1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	1.4%	8	1.9%	7	4.0%	0.7%
BTCEW1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	1.4%	6	1.6%	6	1.4%	4	2.3%	0.6%
BTCVT1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.5%	9	2.1%	3	1.7%	0.4%
BTCEC1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	6	1.6%	1	0.3%	8	1.9%	1	0.6%	0.4%
BTECS1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.3%	6	1.4%	4	2.3%	0.4%

Table 15. Qualifications' codes, names and departments in the Management Sciences faculty

Qualification code	Qualification name	Department
BTHRS1	BT: Human resources management	Applied management (Midlands)
BTMAN1	BT: Management	Applied management (Midlands)
BTPRL1	BT: Public relations management	Applied management (Midlands)
BTMBA1	BT: Management	Business studies unit
BTMGT1	BT: Management (Gauteng)	Business studies unit
BTMPK1	BT: Management (Polokwane)	Business studies unit
BTMSB1	BT: Management (SAB)	Business studies unit
BTTMN1	BT: Tourism management	Ecotourism
BTBAD1	BT: Business administration	Entrepreneurial studies & management
BTMNG1	BT: Management	Entrepreneurial studies & management
BTMNS1	BT: Management (Sport option)	Entrepreneurial studies & management
BTFBM1	BT: Food and beverage management	Hospitality & tourism
BTHSP2	BT: Hospitality management	Hospitality & tourism
BTTRM1	BT: Tourism management	Hospitality & tourism
BTTRM2	BT: Tourism management	Hospitality & tourism
BTHRM1	BT: Human resources management	Human resource management
BTRBM1	BT: Retail business management	Market retail & pub relations
BTMKT1	BT: Marketing	Marketing and retail management
BTOPM1	BT: Operations management	Operations & quality management
BTPOM1	BT: Productions and operations management	Operations & quality management
BTQAL1	BT: Quality	Operations & quality management
BTPMN1	BT: Public management	Public management and economics
BTPBM1	BT: Public management	Public management law and economics (Pietermaritzburg)
BTPRM1	BT: Public relation management	Public management and economics
BTPRD1	BT: Production management	

Table 16. Qualifications' numbers of graduates, frequencies and overall frequencies in the Management Sciences faculty

Qual. code	Year 04\288	Qgf. 2004	Year 05\302	Qgf. 2005	Year 06\312	Qgf. 2006	Year 07\337	Qgf. 2007	Year 08\284	Qgf. 2008	Year 08\284	Qgf. 2009	Year 10\655	Qgf. 2010	Year 11\646	Qgf. 2011	Year 12\719	Qgf. 2012	Year 13\727	Qgf. 2013	Year 14\137	Qgf. 2014	Qgf.
BTMBA1	146	50.7%	115	38.1%	104	33.3%	117	34.7%	87	30.6%	160	34.2%	254	38.8%	244	37.8%	271	37.7%	139	19.1%	62	45.3%	36.4%
BTHRM1	0	0.0%	50	16.6%	32	10.3%	33	9.8%	30	10.6%	37	7.9%	70	10.7%	65	10.1%	84	11.7%	40	5.5%	13	9.5%	9.3%
BTPMN1	11	3.8%	16	5.3%	29	9.3%	34	10.1%	12	4.2%	38	8.1%	41	6.3%	44	6.8%	62	8.6%	115	15.8%	11	8.0%	7.9%
BTBAD1	16	5.6%	13	4.3%	29	9.3%	35	10.4%	30	10.6%	33	7.1%	49	7.5%	38	5.9%	45	6.3%	36	5.0%	3	2.2%	6.7%
BTQAL1	17	5.9%	17	5.6%	18	5.8%	18	5.3%	25	8.8%	43	9.2%	55	8.4%	41	6.3%	31	4.3%	30	4.1%	4	2.9%	6.1%
BTMPK1	9	3.1%	16	5.3%	20	6.4%	31	9.2%	19	6.7%	31	6.6%	46	7.0%	51	7.9%	31	4.3%	39	5.4%	1	0.7%	5.7%
BTPRM1	30	10.4%	11	3.6%	29	9.3%	22	6.5%	17	6.0%	26	5.6%	25	3.8%	32	5.0%	23	3.2%	36	5.0%	1	12.4%	5.4%
BTPBM1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	18	6.3%	30	6.4%	32	4.9%	30	4.6%	53	7.4%	76	10.5%	17	1.5%	4.8%
BTOPM1	0	0.0%	1	0.3%	12	3.8%	23	6.8%	8	2.8%	15	3.2%	19	3.2%	41	6.3%	39	5.4%	41	5.6%	2	1.5%	3.5%
BTMNG1	10	3.5%	20	6.6%	16	5.1%	12	3.6%	12	4.2%	13	2.8%	14	2.8%	8	1.2%	15	2.1%	33	4.5%	2	2.2%	3.4%
BTTRM2	0	0.0%	7	2.3%	10	3.2%	1	0.3%	3	1.1%	10	2.1%	5	2.1%	12	1.9%	16	2.2%	15	2.1%	3	0.0%	1.6%
BTHSP1	8	5.6%	9	6.3%	8	5.1%	0	0.0%	1	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	9.5%	1.6%
BTRBM1	0	0.0%	0	0.0%	0	0.0%	2	0.6%	2	0.7%	1	0.2%	2	0.2%	4	0.6%	11	1.5%	5	0.7%	13	0.0%	1.3%
BTTRM1	19	6.6%	12	4.0%	1	0.3%	4	1.2%	1	0.4%	2	0.4%	0	0.4%	0	0.0%	0	0.0%	0	0.0%	0	0.7%	1.2%
BTPRI1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	6	2.1%	8	1.7%	13	1.7%	11	1.7%	22	3.1%	9	1.2%	1	0.7%	1.1%
BTTMN1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	8	2.8%	7	1.5%	10	1.5%	6	0.9%	8	1.1%	18	2.5%	1	0.0%	1.0%
BTHSP2	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	0.7%	9	1.9%	8	1.9%	13	2.0%	6	0.8%	15	2.1%	0	0.0%	0.8%
BTPOM1	15	5.2%	10	3.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.7%	0.8%
BTFBM1	4	1.4%	2	0.7%	2	0.6%	5	1.5%	3	1.1%	1	0.2%	2	0.2%	1	0.2%	0	0.0%	3	0.4%	1	0.0%	0.6%
BTMGT1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	38	5.2%	0	1.5%	0.5%
BTHRS1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	0.9%	4	0.9%	5	0.8%	2	0.3%	1	0.1%	2	0.0%	0.4%
BTMPK1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	22	3.0%	0	0.0%	0.3%
BTPRD1	3	1.0%	3	1.0%	2	1.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.2%
BTMSB1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	15	2.1%	0	0.0%	0.2%
BTMAN1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	0.1%

Table 17. The numbers of registered BTech students and the departments' names

BTech students	Department name
1986	Business studies unit
1423	Civileng & surv (Durban)
998	Auditing and taxation
954	Chemical engineering
902	Electronic engineering
884	Nursing
862	Entrepreneurial studies & MGMT
839	Operations & quality management
780	Management accounting
749	Community health studies
748	Const MNGT & quant surveying
654	Human resource management
644	Electrical power engineering
615	Mechanical engineering
583	Civil engineering (Midlands)
527	Public MNGT and economics
461	Information & corporate MGMT
396	Industrial engineering
391	Market retail & pub relations
388	Biomed & clinical technology
340	Biotechnology & food tech
317	Public MNGT law & economics (PMB)
289	Applied management (Midlands)
289	Media lang & communication
259	Emerg medical care & rescue
226	Hospitality and tourism
219	Town and regional planning
215	Visual communication design
211	Marketing and retail MNGT
200	Chiropractic and stomatology
183	Architect technology
181	Chemistry
161	Financial accounting
146	Food and nutrit consumer science

Table 17 (cont.). The numbers of registered BTech students and the departments' names

BTech students	Department name
88	Dental sciences
85	Fine art & jewellery design
60	Video technology
56	Ecotourism
42	Horticulture
25	Sport studies

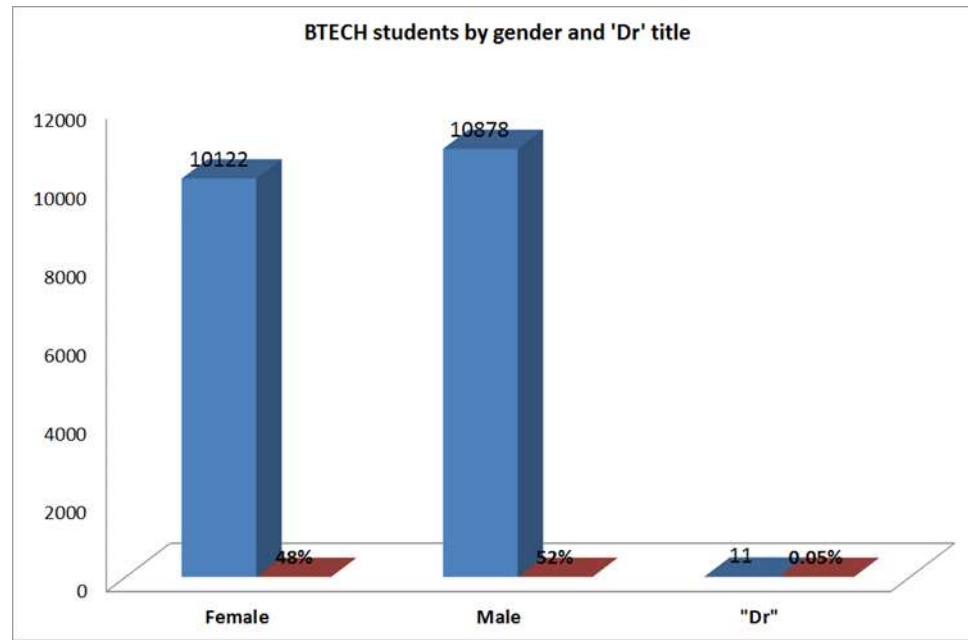


Fig. 10. The BTech students by gender and 'Dr' title

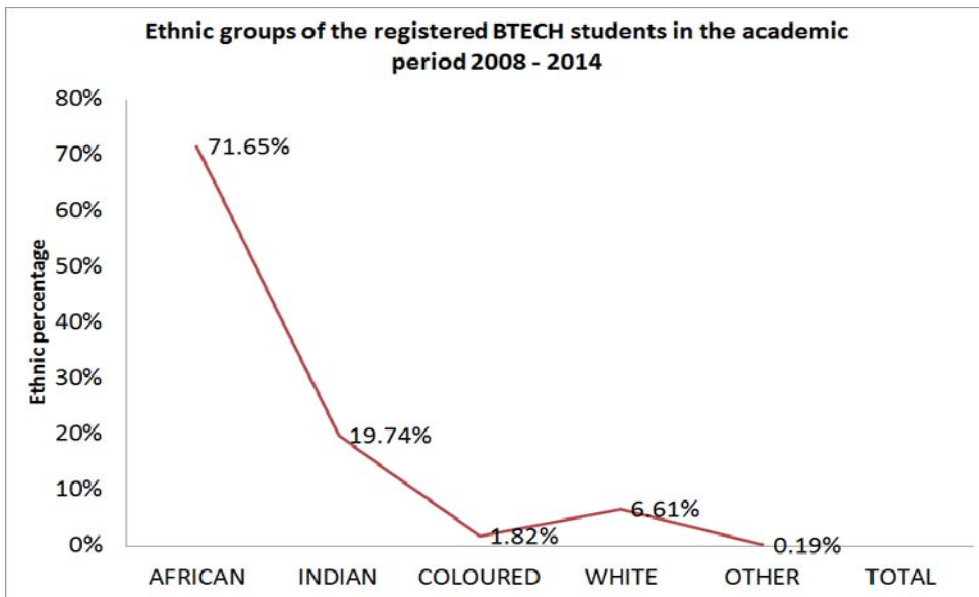


Fig. 11. Ethnic groups of the registered BTECH students.

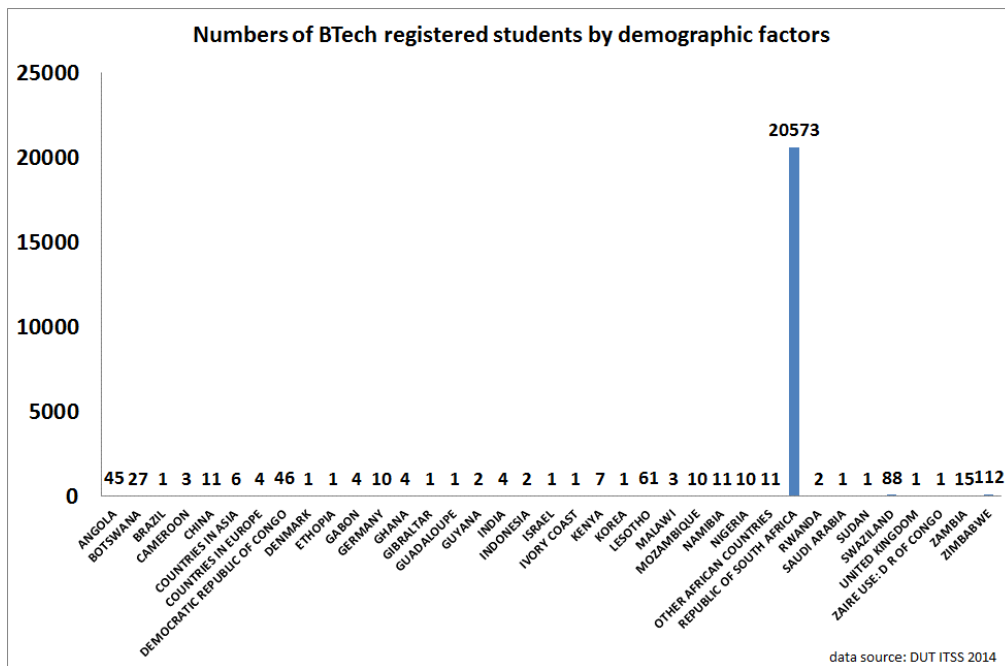


Fig. 12. The numbers of BTECH registered students by demographic factors