Report on

Hawaii Tax Credit for Research Activities

for Tax Year 2017

August 2018

Department of Business, Economic Development and Tourism

State of Hawaii

Table of Contents

List of Tables

List of Figures

Executive Summary

- A total of fifteen Qualified High Technology Businesses (QHTBs) completed the survey with the State Department of Business, Economic Development and Tourism (DBEDT) for the Hawaii research tax credit for the tax year 2017. The fifteen QHTBs reported that they spent an aggregate amount of $23.4 million in research activities in Hawaii in 2017. Among those, $19.3 million (82.6 %) was eligible for the research tax credit, and a total of $1.3 million was claimed or to be claimed for the research tax credit in the State of Hawaii tax form N346.

- Among the fifteen QHTBs that completed the survey with DBEDT for the tax year 2017, all except one were established before 2010 and have been undertaking the research activities for at least seven years.

- A total of 137 patents were owned or filed by eight QHTBs as of December 2017 (93 owned, 44 pending). Seven QHTBs had no patents owned or filed as of December 2017.

- "Ocean Science" and "Defense/Aerospace" were the most prevalent business sectors with five QHTBs doing business in each sector. "Energy" was another popular industry sector with four QHTBs doing business in the sector. The next were "Astronomy" and "Information & Communication Technology" sectors holding three QHTBs each.

- In 2017, the fifteen QHTBs generated a total of $76.2 million revenue from all goods and services produced in Hawaii, of which 40.5% ($30.8 million) was derived from out-of-state sales or activities. About half of the total revenue was earned from intellectual properties that QHTBs produced in Hawaii.

- The fifteen QHTBs spent a total of $67.3 million in 2017 as operating expenses or capital expenditures for sales and activities performed in Hawaii, of which 32.0% ($21.5 million) was incurred in the "Film/Digital Media" sector.

- As of December 2017, the fifteen QHTBs had a total of 391 regular employees (373 full-time and 18 part-time employees) altogether. About three fourths of the regular employees were employed in research activities.

- Over 75% of full-time employees in the QHTBs got paid $60,000 and more annually, of which about half were paid more than $100,000 annually.

- Despite incremental research activities being expected for the QHTBs, almost all QHTBs that completed the survey with DBEDT experienced a job loss between 2016 and 2017. Job losses were observed both in research and non-research positions.

- Nine QHTBs, or 60%, reported that they had independent contractor expenses in 2017. The nine QHTBs spent a total of $3.0 million to hire 174 contractors or external services for jobs performed in Hawaii in 2017.

- According to the State Department of Taxation, eighteen claims (including corporations and individuals) were processed as of July 31, 2018 for the state research tax credit for the tax year 2017. The total amount of the eighteen claims was $675,680.

- Statistics of research activity tax credits claimed with the State Department of Taxation are now available for the tax year 2013, 2014, 2015, and 2016[1]. In comparison with the credit amount reported in the survey with DBEDT, the credit amount claimed with the Department of Taxation were more than twice as much for the tax year 2014, 2015, and 2016. It suggests a high possibility that not all businesses that claimed the tax credit with Department of Taxation completed the survey with DBEDT.

[1] Data for the tax year 2016 are preliminary.

Table S1. Summary statistics on the characteristics and activities of QHTBs

	2017 tax year	2016 tax year	2015 tax year	2014 tax year	2013 tax year
Number of QHTB submitted TCRA survey	15[1]	11	12	13	10
Total Tax credit claimed for Hawaii TCRA	$1.3M	$1.3M	$1.1M	$1.3 M	$1.1 M
Total Research expense incurred in Hawaii	$23.4M	$23.1M	$20.1M	$28.1 M	$25.7 M
Avg. Tax credit claimed for Hawaii TCRA		$122K	$89K	$100 K	$109 K
Popular areas of research [2] (number of QHTBs)	Computer Software(8) Non-fossil fuel(5) Ocean science(4) Biotechnology(3)	Computer Software(8) Non-fossil fuel(5) Ocean science(5)	Computer software(8) Non-Fossil fuel(5) Ocean science(5) Biotechnology(3)	Computer software(7) Biotechnology (5) Ocean sciences (5) Non-fossil fuel (4)	Computer software(5) Biotechnology (3) Ocean sciences (2) Non-fossil fuel (2)
Business/Revenue/Expense					
Popular areas of businesses [2](number of QHTBs)	Ocean science(5) Defense/Aerospace(5) Energy(4)	Ocean science(7) Defense/Aerospace(5) Energy(4) Infor./Comm. Tech(4)	Energy(6) Ocean science(5) Defense/Aerospace(4) Infor./Comm. Tech(4)	Defense/Aerospace(7) Energy(5) Other Sciences(5)	Defense/Aerospace(4) Biotech/Life Sci.(4) Infor./Comm. Tech(4)
Total number of patents owned or filed	137	105	116	158	107
Avg. Revenue per QHTB	$5.1 M	$6.1M	$3.9M	$4.0 M	$5.4 M
% of revenue from out of state sale	40.5%	49.6%	70.3%	65.2%	66.2%
% of revenue from intellectual property	45.6%	61.3%	32.5%	23.4%	30%
Avg. Operating expenses per QHTB	$4.3M	$4.2M	$3.2M	$3.4 M	$4.3 M
Avg. Capital expenditure per QHTB [3]	$150K	$75K	$59K	$26 K	$247 K
Employment [4]					
Total number of employees	391	330	270	297	338
Avg. number of employees per QHTB	26.1	30.0	22.5	22.8	33.8
Research jobs as % of total jobs	73.7%	76.9%	72.6%	78.5%	77.2%
Full time jobs as % of total jobs	95.4%	93.0%	91.1%	86.9%	82.8%
% of jobs with wage $60K or higher	74.4%	74.2%	76.3%	78.5%	71.7%
% of jobs with wage $100K or higher	37.1%	34.2%	41.5%	39.4%	31.7%
Change in total jobs from last year	-30 (-7.1%)	-25 (-7.0%)	-14 (-4.9%)	18 (6.5%)	-20 (-6.0%)
Change in research jobs from last year	-17 (-5.6%)	-25 (-9.0%)	-13 (-6.2%)	24 (11.5%)	-7 (-2.8%)

1. 11 QHTBs have completed the research tax credit survey in at least one tax year since 2013.
2. A company was counted multiple times if it conducted business/research in more than a sector.
3. Capital expenditure includes land, construction, and equipment purchase.
4. Includes both full-time and part-time jobs, but doesn't include temporary or seasonal jobs.

1. Introduction

Many states have been implementing a state research tax credit in conjunction with the federal research tax credit, to further promote research activities of businesses in the state.

Hawaii's effort to encourage research activities through tax incentives started as early as 1999. Act 178 in 1999 contained a state tax credit for research activities. However, the tax credit was limited to 2.5% of new research expenses in Hawaii and was non-refundable.

Benefits of the Hawaii research tax credit increased substantially in 2000, when Act 297 raised the Hawaii research tax credit from 2.5% to 20% of the qualified research expenses to match the federal standard and made the credit refundable. Act 221 in 2001 further augmented the benefits by allowing the credit to be claimed for all qualified research expenses, not just the incremental amount. Hawaii research tax credit was amended once more in 2004 when Act 215 limited credit eligibility to qualified high technology businesses (QHTBs) only. This old research tax credit sunsetted in 2010.

Act 270, Session Laws of Hawaii 2013, re-established Hawaii's research tax credit for tax year from 2013 to 2019. The credit remains to be 20% of the qualified research expenditures and continues to be refundable. However, it defined QHTBs more narrowly and adopted federal rules again for eligibility, which means that qualified research expenses are limited to incremental amounts only.

Act 270 also enhanced reporting requirements. It mandated all QHTBs that claim the state research credit to complete an annual survey with DBEDT. Based on the survey result, DBEDT is required to submit a report to the legislature on the activities of the QHTBs to measure the effectiveness of the research tax credit.

This is the fifth report that is prepared pursuant to Act 270. This report includes statistics on various activities of QHTBs that completed the research activity tax credit survey with DBEDT for their taxable year 2017. Most statistics reported in this report are for activities undertaken in calendar year 2017.

2. Characteristics of QHTBs

For the tax year 2017, a total of fifteen QHTBs completed the survey with DBEDT on the Hawaii tax credit for research activities. QHTBs in this report refer to the fifteen companies unless otherwise stated.

Age of QHTBs

All QHTBs that submitted the Hawaii research tax credit survey for the tax year 2017 have been doing business for many years. All except one company were established before 2010. Seven QHTBs were established before 2000 whereas seven QHTBs were established between 2000 and 2010 and one recently in 2015.

Table 1. QHTBs by year established

Year established	~ 1990	1991-1999	2000-2005	2006-2010	2011 and after
Number of QHTBs	4	3	2	5	1

History of research activity was also long. All QHTBs except one established recently reported that they had been undertaking the research activities for at least seven years.

Table 2. History of research activities

Years	Less than 7 years	7 years or longer
Number of QHTBs	1	14

Intellectual Properties

More than 130 patents were owned or filed with the U.S. Patents and Trademark office by the QHTBs. As of December 31, 2017, a total of 93 patents were owned by the QHTBs while another 44 patents were filed and pending. However, not all QHTBs owned or have filed patents. About half of the fifteen QHTBs had no patent owned or filed as of December 31, 2017.

Table 3. Patents owned or filed by QHTBs (as of Dec 31, 2017)

Total number of patents owned or filed by QHTBs			Number of QHTBs with at least one patent owned or filed	Number of QHTBs with more than 30 patents owned or filed
Total	Owned	Pending		
137	93	44	8 out of 15	3 out of 15

Two third of the QHTBs reported that they owned intellectual property such as copyrights and trademarks. That includes all QHTBs that owned or filed at least one patent, and two QHTBs that had no patent owned or filed.

Table 4. Other intellectual property owned by QHTBs (as of Dec 31, 2017)

Total number of QHTBs that submitted tax credit surveys	Number of QHTBs with other intellectual property			
	Copyrights	Trade Secrets	Licenses	Trademarks
15	4	4	7	9

Business sector of QHTBs

The survey asked each QHTB to indicate all industry sectors in which the QHTB conducted business in 2017. Eight major business sectors consisting of eighty four subsectors were provided in the survey as business categories. Two third of the QHTBs indicated that they were doing business only in one business sector whilst other one third, five QHTBs, indicated that they did business in more than one business sector.

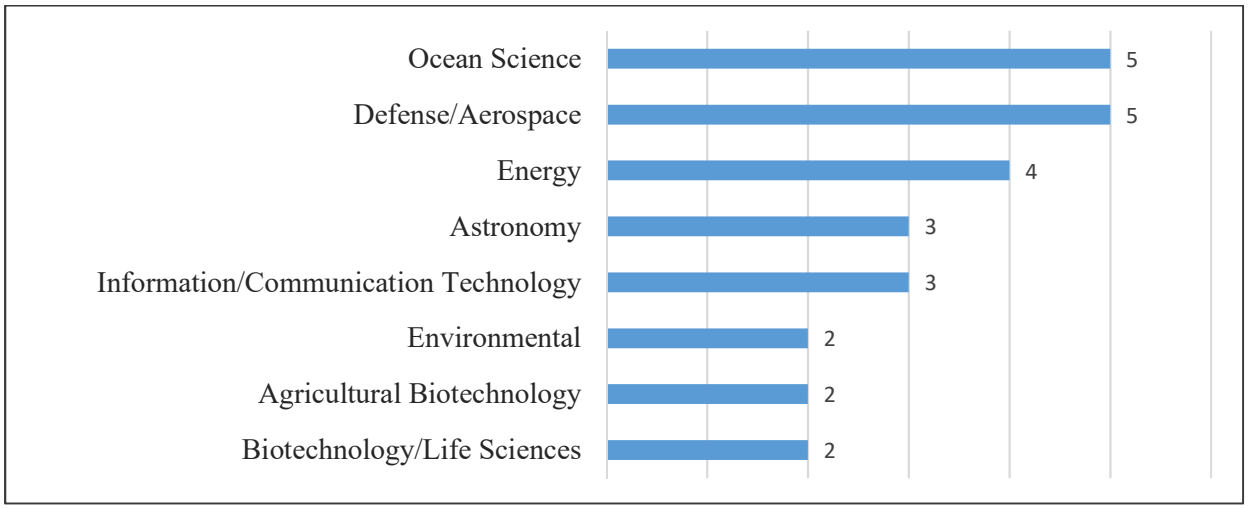
Table 5. Business areas of QHTBs in 2017 (number of QHTBs)

Business sectors		Number of QHTBs
One sector only	Astronomy	2
	Defense/Aerospace	2
	Information/Communication Technology	2
	Agricultural Biotechnology	1
	Biotechnology/Life Sciences	1
	Environmental	1
	Ocean Science	1
Doing business in more than one sector		5

Figure 1 shows total number of QHTBs that conducted business in each industry sector in 2017, counting the multi-sector companies multiple times for all industry sectors they did business in.

"Ocean Science" and "Defense/Aerospace" were the most popular business areas among the QHTB hosting five QHTBs each. "Energy" was another popular industry sector with four QHTBs doing business in the sector. The next were "Astronomy" and "Information & Communication Technology" sectors holding three QHTBs each.

Figure 1. Number of QHTBs that conducted business in each sector (with multiple counting) [1]



[1] Multi-sector companies were counted for all sectors in which they did business.

Table A-2 and Figure A-1 in the appendix at the end of this report show business activities of QHTBs by detailed business activity. Specialty software development in the "Defense and Aerospace" sector was the most prevalent business activity amongst the QHTBs in 2017.

3. Revenue and Spending Structure

Revenue structure of QHTBs

In 2017, the fifteen QHTBs generated a total of $76.2 million revenue from all goods and services produced in Hawaii, of which 40.5% ($30.8 million) was derived from out-of state sales or activities.

About half of the total revenue was earned from intellectual properties that QHTBs produced in Hawaii. The combined revenue of the fifteen QHTBs from their intellectual properties, by selling patented products or licensing royalty, etc., was $34.8 million in 2017. Of which, 28.3% ($9.8 million) was earned from out-of-state sales.

Table 6. Revenues of QHTBs, by revenue source

Source of revenue	Revenue in 2017	
Total revenue	$76,184,808	100%
- from out-of-state sales	$30,829,221	40.5%
Revenue from intellectual property	$34,761,314	100%
- from out-of-state sales	$9,841,048	28.3%

Hawaii expenses of QHTBs

The fifteen QHTBs spent a total of $67.3 million in 2017 as operating expenses or capital expenditures for sales and activities performed in Hawaii.

Table 7. Operating and Capital expenditure spent by QHTBs in 2017

Operating Expenses spent by QHTBs	Capital Expenditures spent by QHTBs
$65,044,377	$2,254,048

Table 8 presents where the QHTBs made the spending in 2017 by industry sector. 32.0% ($21.5 million) of the QHTBs' Hawaii expenses was incurred in "Film/Digital Media" while another 20.3% ($13.6 million) of the spending was incurred in the "Biotechnology and Life Sciences" sector.

The subsector that received the largest QHTBs' spending in 2017 was Content Development in "Film/Digital Media". $21.5 million spending was made in this subsector in 2017. Other subsectors that received a large expenditure include Contract Research Organization in "Biotechnology/Life Sciences" ($10.6 million), Telecommunications/Networks in "Information and Communication Technology" ($7.1 million), and Ocean Engineering in "Ocean Sciences" ($5.4 million).

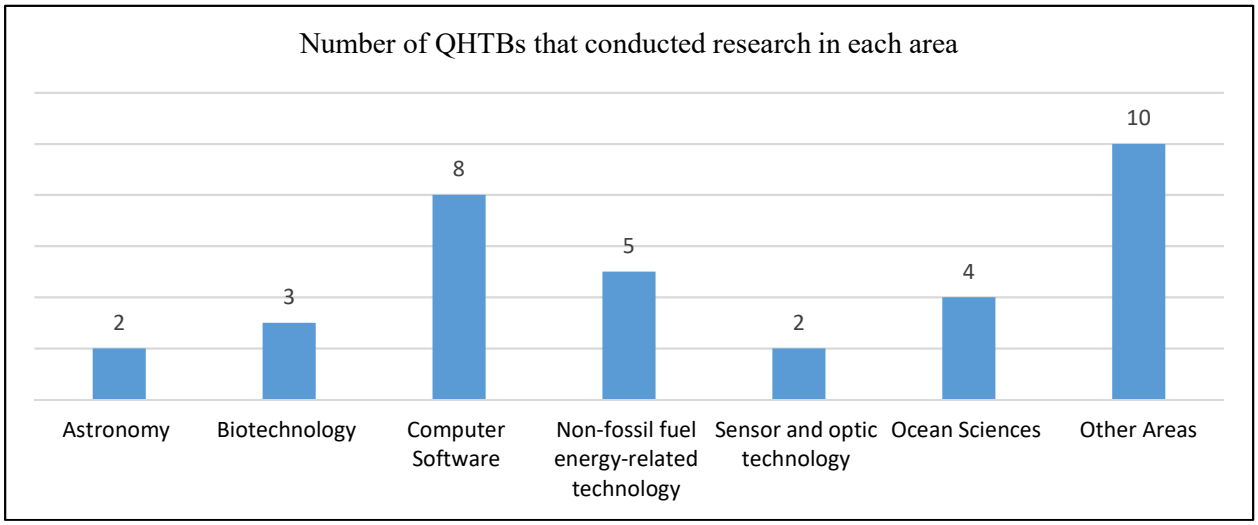
Table 8. Areas where QHTBs spent their operating and capital expenditures in 2017

All sectors	**$67,298,425**	**100.0%**
Film/Digital Media	**$21,544,334**	**32.0%**
- Content Development	$21,544,334	32.0%
Biotechnology/Life Sciences	**$13,636,757**	**20.3%**
- Contract Research Organization	$10,614,478	15.8%
- Medical Devices	$1,536,443	2.3%
- Seed Propagation/Seed Corn	$22,691	0.03%
- Other	$1,463,145	2.2%
Defense/Aerospace	**$10,910,959**	**16.2%**
- Specialty Software Development	$4,901,203	7.3%
- Modelling/Simulation/Training	$4,853,343	7.2%
- Remote Sensing	$992,232	1.5%
- Unmanned Vehicles/Robotics	$164,180	0.2%
Information/Communication Technology	**$9,437,066**	**14.0%**
- Telecommunications/Networks	$7,088,933	10.5%
- Specialty Software Development -	$1,310,799	1.9%
- Information Services-	$1,037,334	1.5%
Ocean Sciences	**$6,047,377**	**9.0%**
- Ocean Engineering	$5,377,359	8.0%
- Marine Biotechnology	$16,257	0.02%
- Other	$653,760	1.0%
Environmental	**$2,492,908**	**3.7%**
- Water Technologies	$2,492,908	3.7%
Energy	**$886,096**	**1.3%**
- Energy Efficiency	$886,096	1.3%
Astronomy	**$202,149**	**0.3%**
- Photonics	$187,999	0.3%
- Adaptive Optics	$14,150	0.02%
Agricultural Biotechnology	**$146,315**	**0.2%**
- Plant Tissue Culture	$146,315	0.2%
Unidentified	$1,984,465	2.9%

4. Research Activities and Tax Credit

Businesses were asked to indicate in which area they conducted research during the year. Seven broad categories were provided in the survey. Figure 2 presents the number of QHTBs that conducted research in each research area allowing multiple counting of a QHTB if it conducted research in multiple areas. Among the fifteen QHTBs, seven companies reported that they conducted research in more than one area. "Computer Software" was the most widely held research area with eight companies having conducted research in the area in 2017. Other research area that were popular among the QHTBs includes "Non-Fossil Fuel Energy Related Technology" and "Ocean Sciences".

Figure 2. Areas where QHTBs conducted research in 2017



In defining "Qualified Research Activities" for the Hawaii research activity tax credit, Act 270 adopted §41 of the Internal Revenue Code, meaning that only incremental amounts are eligible for the credit, with a further requirement that qualified research activities do not include research expenses incurred outside of the state.

The fifteen QHTBs who completed the Hawaii research credit survey for the tax year 2017 reported that they spent an aggregate amount of $23.4 million in research activities in Hawaii in

2017. Among those, $19.3 million (82.6%) was eligible for the Hawaii tax credit for research activities (TCRA), and a total of $1.3 million was claimed or to be claimed by the fifteen QHTBs for the tax credit on Form N346.

The amount that individual QHTB claimed for the Hawaii research tax credit varied significantly ranging from $300 to over $300,000. Five QHTBs reported that they claimed more than $100,000 for the research credit on Form N346 for the tax year 2017. All fifteen QHTBs reported that they paid zero corporate income tax for tax year 2017.

Table 9. Reported research expenses and tax credit for tax year 2017

Total Research Expenses occurred in Hawaii	Total Research Expenses eligible for Hawaii TCRA	Total Tax Credit reported for Hawaii TCRA
$23,379,719 100%	$19,304,381 82.6%	$1,293,816

5. Job Characteristics and Creation

Employment overview

As of December 12, 2017, the fifteen QHTBs had a total of 391 regular employees (373 full-time and 18 part-time employees). About three fourth of the regular employees were employed in research sectors. The share of research activity jobs was higher in full-time jobs than in part-time jobs.

A total of 17 workers were employed on a temporary or seasonal basis by the QHTBs during the calendar year 2017. Out of the 17 temporarily or seasonally hired workers, 15 workers (88.2%) were employed to work on research activities.

Table 10. Number of employees employed by QHTBs, by employment status

	As of December 2017			Temporary / Seasonal in 2017
	Total	Full-time	Part-time	
All areas	391	373	18	17
In research activities	288	277	11	15
Research activity jobs as % of total jobs	73.7%	74.3%	61.1%	88.2%

Employment size

Size of the fifteen QHTBs in terms of number of employment varied substantially. The number of regular employees that each of the QHTBs had as of December 2017 ranged as small as 0 to as big as 99. Four companies were particularly small with one or no employees. On the other hand, two companies were relatively big with 80 or more employees.

Table 11. QHTBs by employment size

Number of regular employees [1] (as of December 2017)	**Number of QHTBs**
0-5	4
6-10	2
11-25	3
26-50	4
51-100	2

[1] Excludes temporary and seasonal employees

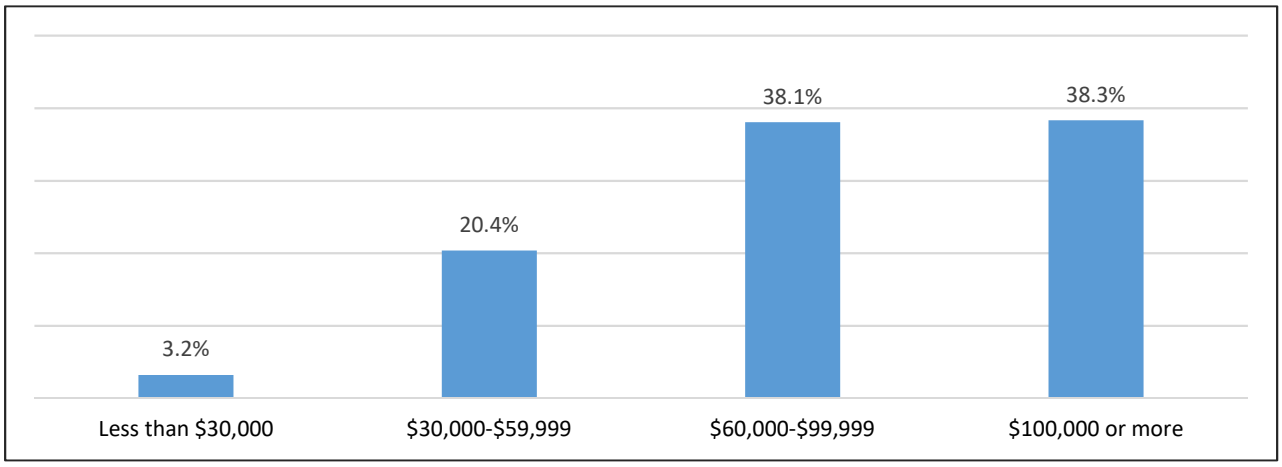
Compensation levels of jobs in QHTBs

Table 12 shows the number of employees and their shares of total employees by four wage groups. Over 75% of full-time employees in the QHTBs got paid $60,000 and more annually, of which about half were paid more than $100,000 annually.

Table 12. Full-time and part-time employees in 2017 by wage level

Annual wage	Full & Part-time		Full-time		Part-time	
	Jobs	Share	Jobs	Share	Jobs	Share
Less than $30,000	21	5.4%	12	3.2%	9	50.0%
$30,000-$59,999	79	20.2%	76	20.4%	3	16.7%
$60,000-$99,999	146	37.3%	142	38.1%	4	22.2%
$100,000 or more	145	37.1%	143	38.3%	2	11.1%
Total	391	100%	373	100%	18	100%

Figure 3. Full- time employees of QHTBs in 2017 by wage level



Job changes in QHTBs from the previous year

Despite incremental research activities being expected for the QHTBs, almost all QHTBs that completed the survey with DBEDT for the tax year 2017 experienced a job loss between 2016 and 2017. Among the fifteen QHTBs, only two QHTBs reported an increase in its employment between 2016 and 2017. Job losses were observed both in research and non-research positions. In December 2017, the aggregate number of full-time research jobs in the fifteen QHTBs was 5.6% lower than they had a year ago.

Table 13. Employment changes in QHTBs between 2016 and 2017

Type of Employment		2017	2016	Changes from 2016
Full-time &Part-time	In all areas	391	421	-30
	In research activities	288	305	-17
Full-time	In all areas	373	397	-24
	In research activities	277	287	-10
Part-time	In all areas	18	24	-6
	In research activities	11	18	-7

6. Impacts of QHTBs' Activities on External Companies

Table 14 summarizes impacts of the QHTBs' business activities on external companies in Hawaii in 2017. Nine QHTBs, or 60%, reported that they had independent contractor expenses in 2017. The nine QHTBs spent a total of $3.0 million to hire 174 contractors or external services for jobs performed in Hawaii. Among this spending, 70% ($2.1 million) was spent in the area of "Scientific and Technical Contract Services".

The survey also asked if there was any new company established to commercialize the intellectual property owned by the QHTBs. The survey results indicated that there was no new company established in 2017.

Table 14. Impacts of QHTBs' activities on external companies in Hawaii in 2017

Independent contractor expenses incurred by the QHTBs	$3,031,042
Total number of independent contractors hired/external services procured by the QHTBs	174
Number of new companies established in Hawaii to commercialize the QHTBs' intellectual property	0

7. Tax Credit Claimed with the State Department of Taxation

According to the State Department of Taxation, eighteen claims (including corporations and individuals) were processed as of July 31, 2018 for the state research tax credit for the tax year 2017. The total amount of the eighteen claims was $675,680.

The number and amount reported in the DBEDT survey and the tax credit claims processed by the Department of Taxation are not directly comparable for two reasons. First, the number of claims with the Department of Taxation for the tax credit may be greater than the number of surveys completed with DBEDT by the QHTBs because of the pass-through taxation. If a QHTB is a partnership or other pass-through entity, the tax credits earned by the QHTB are passed through to its individual members, who claim the tax credits on their tax returns. The second cause of the discrepancy is timing differences. The surveys completed by QHTBs this year were due June 30, 2018. If a taxpayer is an individual or corporation with a tax year same as the calendar year, the tax return for the tax year 2017 was due April 20, 2018. However, the due date may be extended to October 20, 2018 if the taxpayer requests an automatic extension. Thus, the claims processed until July 2018 likely represent only a part of the total claims that will be filed for the tax year 2017.

Meanwhile, data for total tax credits claimed with the State Department of Taxation are now available for the tax year 2013, 2014, 2015, and 2016. Compared with the credit amount reported in the survey with DBEDT, the credit amount claimed with the Department of Taxation were more than twice as much for the tax year 2014, 2015, and 2016. It suggests a high possibility that not all businesses who claimed the tax credit with the Department of Taxation completed the survey with DBEDT.

Table 15. Research Activity Tax Credits Claimed with the Department of Taxation

Tax Year	Claimed with Department of Taxation [1]				Reported in the survey with DBEDT	
	Number of Claims			Credit Amount	Number of QHTBs that completed the survey	Credit Amount
	All	Individuals	Corporations			
2013	25	13	12	$1.3 M	10	$1.1 M
2014	69	49	20	$2.9 M	13	$1.3 M
2015	57	33	24	$2.9 M	12	$1.1 M
2016	58 [2]	31 [2]	27 [2]	$3.1M [2]	15	$1.3 M

[1] Tax Credits Claimed by Hawaii Taxpayers, Tax Year 2013, 2014, 2015, Hawaii Department of Taxation
[2] Preliminary number from the Hawaii Department of Taxation

Appendix

Table A- 1. List of QHTBs that completed Hawaii TCRA survey with DBEDT

Company name	Business Location	Tax Year				
		2017	2016	2015	2014	2013
Architects Hawaii LLC	Honolulu County	o	o			
Advanced Integrated Photonics INC.	Culver City, California					o
Alternative Energy Technologies, LLC	Honolulu County					o
AT&T Services, INC	San Antonio, Texas	o				
Computer Software Associates, INC.	Kihei, Maui County			o		
DataHouse Consulting, INC.	Honolulu County					o
Douglas W Toomey	Hawaii County			o		
Innovasc LLC	Honolulu County			o	o	
Kamakura Corporation	Honolulu County					o
Kuehnle AgroSystems INC.	Honolulu County	o	o	o	o	
Laulima Systems LLC	Kauai County				o	
Limitiaco Consulting Group. INC.	Honolulu County	o				
Makai Ocean Engineering, INC.	Honolulu County	o	o	o	o	o
Mauna Kea Infrared, LLC	Hawaii County	o				
Navatek Alternative Energy Technologies	Honolulu County	o	o			
Navatek CFD Technologies, LLC	Honolulu County	o	o	o	o	
Navatek Lifting Body Technologies, LLC	Honolulu County	o	o	o	o	
Navatek LTD	Honolulu County	o	o	o	o	
Oceanit Laboratories, INC.	Honolulu County	o	o	o	o	o
Quantify IP	Honolulu County	o	o			
Resurgo, LLC	Honolulu County				o	
Spirent Communications Hawaii LLC	Honolulu County	o	o	o	o	o
Sustainable Bioresources, LLC	Honolulu County	o				
TeraSys Technologies LLC	Honolulu County				o	o
Tissue Genesis Institute, LLC	Honolulu County	o			o	o
Tissue Genesis, INC.	Honolulu County				o	o
Tritium Enterprises LLC	Honolulu County			o		
Velocitek INC.	Maui County		o	o		

Table A- 2. Business areas of QHTBs in 2017, by detailed activity

(A QHTB is counted multiple times if it conducted business in multiple areas)

Industry sector	Subsector	Number of QHTBs conduced business in the subsector
Agricultural Biotechnology	Aquaculture	1
	Plant Tissue Culture	1
	Seed Propagation/Seed Corn	1
Astronomy	Adaptive Optics	2
	Modeling & Simulation	1
	Photonics	1
	Precision Mechanics	1
	Remote Sensing	2
Biotechnology/Life Sciences	Biologics/Vaccines	1
	Contract Research Organization	1
	Medical Devices	1
Defense/Aerospace	Communications & Computer Systems	1
	Modeling/Simulation/Training	3
	Optics	1
	Photonics	1
	Remote Sensing	1
	Specialty Software Development	6
	Testing & Evaluation	1
	Unmanned Vehicles/Robotics	4
	Other	1
Energy	Energy Efficiency	3
	Renewable Fuels	1
	Other	1
Environmental	Disaster Mitigation Management	1
	Water Technologies	2
	Other	1
Information/Communication	Information Service	1
	Specialty Software Development	2
	Telecommunications/Networks	2
	Testing & Evaluation	1
	Wireless	2
	Other	1
Ocean Sciences	Marine Biotechnology	1
	Ocean Engineering	1
	Other	3
Other	Architecture	1
	Nano technology-coating/materials	1
	Innovative Civil Engineering Design	1

Figure A-1. Number of QHTBs that conducted business in each subsector
(A QHTB is counted multiple times if it conducted business in multiple areas)