

2019년도 전국시도연구원협의회 하반기 해외연수 결과 보고서

연수국가 : 말레이시아/싱가포르

연수일정 : 2019. 10. 20.(일) ~ 10. 25.(금) [4박6일]

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5. 연수 내용

1) Halal industry Development Corporation(HDC)

2) National Institutes of Biotechnology Malaysia(NIBM)

3) The Housing & Development Board(HDB)

4) Agency for Science, Technology And Research(A*STAR)

6. 연수 소감

1 연수 개요

- 기 간 : 2019. 10. 20.(일) ~ 10. 25.(금) [4박6일]
- 장 소 : 말레이시아/싱가포르
- 참 가 자 : 전국시도연구원협의회 관련 임직원 37명
- 연수목적
 - 아세안 국가들과의 관계를 발전시키고 신남방 정책을 추진하기 위한 지역별 특성화 전략을 위해 신남방정책의 핵심국가인 말레이시아와 싱가포르의 우수사례 기관 벤치마킹
 - 아세안 국가와의 경제협력을 통한 4차 산업시대 새로운 성장동력과 지속가능 성장의 인프라 구축방안 모색

2 참가자 명단

NO	기관명	직위	성명	영문명
1	한국지방행정연구원	부연구위원	여규동	YEO KYU DONG
2		4급사무원	권경철	KWON KYOUNG CHUL
3	서울연구원	도시자료분석팀장	박은순	PARK EUN SOON
4		일반직4	홍현주	HONG HYEON JU
5		위촉연구원	손우진	SON WOO JIN
6	인천연구원	부원장	김창수	KIM CHANG SU
7		과장	김상태	KIM SANG TAI
8	대구경북연구원	경제일자리연구실장	임규채	LIM KYU CHAE
9		6급관리원	황우석	HWANG WOO SEOK
10	광주전남연구원	연구기획본부장	곽행구	GWAK HAENG GOO
11		책임연구위원	김진이	KIM JIN EI
12		연구기획팀장	박현주	PARK HYUN JU
13	울산발전연구원	전략기획실장	이은규	LEE EUN GYU
14		사무원	김충민	KIM CHUNG MIN

15	울산발전연구원	담당	정지은	JEONG JI EUN
16	경기연구원	균형발전본부장	김동성	KIM DONG SUNG
17		행정원	김지은	KIM JI EUN
18	강원연구원	기획경영실장	전만식	JUN MAN SIG
19		전임연구원	정윤희	JEUNG YOON HEE
20		행정원	양은혜	YANG EUN HYE
21	충북연구원	기획경영실장	정연정	JUNG YEON JUNG
22		연구행정과장	육환수	YOOK HWAN SOO
23		행정원	이예인	LEE YE IN
24		행정원	이현정	LEE HYUN JEONG
25	경남연구원	경제산업연구실장	김진근	KIM JIN KEUN
26		공공투자개발 관리센터장	김기수	KIM KI SOO
27		연구지원차장	서상래	SUH SANG RAE
28	제주연구원	연구위원	김현철	KIM HYUN CHEOL
29		행정직	홍주현	HONG JU HYUN
30	한국지방세연구원	교육본부장	노찬호	RHO CHAN HO
31		주임	유원준	YOO WON JUN
32		대리	송형석	SONG HYONG SUCK
33	전북연구원	원장	김선기	KIM SUN KI
34		연구기획부장	장남정	JANG NAM JUNG
35		관리직	이한호	LEE HAN HO
36		부연구위원	오병록	OH PYONG ROK
37		전문연구원	김도연	KIM DO YEON

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주요 일정

일자	시간	세 부 일 정	비고
10/20 (일)	14:00 16:35-21:55 22:00	<ul style="list-style-type: none"> ● 집합 : 인천 국제공항 ● 출국 : 인천 → 쿠알라룸푸르(KE 671 16:35 - 21:55) ● 도착 & 연수 간담회 	인천 쿠알라 룸푸르
10/21 (월)	AM PM	<ul style="list-style-type: none"> ● 인프라 탐방 & 자료수집 ● 중식 & 이동 ● 공식방문1) Halal industry Development Corporation (HDC, 말레이시아 할랄산업개발공사) ● 석식 & 연수 평가회 	쿠알라 룸푸르
10/22 (화)	AM PM	<ul style="list-style-type: none"> ● 공식방문2) National Institutes of Biotechnology Malaysia (NIBM, 말레이시아 국립생명공학원) ● 중식 ● 이동 : 쿠알라룸푸르 → 싱가포르(조호바루 국경 통과) ● 석식 & 연수 디브리핑 	쿠알라 룸푸르 싱가 포르
10/23 (수)	AM PM	<ul style="list-style-type: none"> ● 인프라 탐방 ● 중식 & 이동 ● 공식방문3) The Housing & Development Board (HDB, 싱가포르 주택개발청) ● 석식 & 연수 간담회 	싱가 포르
10/24 (목)	AM PM	<ul style="list-style-type: none"> ● 인프라 탐방 ● 중식 & 이동 ● 공식방문4) Agency for Science, Technology And Research (A*STAR, 싱가포르 과학기술연구청) ● 연수 평가회 ● 귀국 : 싱가포르 → 인천 (KE 644 22:35 - 익일 06:00) 	싱가 포르
10/25 (금)	06:10	<ul style="list-style-type: none"> ● 인천 도착 	인천

4 방문 국가

1) 말레이시아

가. 개요

- 인구 31,949,777명 (2019 추계)
- 수도 쿠알라룸푸르 (Kuala Lumpur)
- 면적 330,345km² (세계 66위, 한반도의 1.5배)
- 공식명칭 말레이시아(Malaysia)
- 언어 말레이어
- 정부/의회형태 의원내각제 / 양원제
- GDP USD 3,543억 (2018 추계)



나. 경제 현황

- 말레이시아는 원유, 천연가스, 야자유, 주석, 천연고무 등 천연자원이 풍부한 나라이다. 야자유(세계 생산 2위), 천연고무(3위), 주석(10위), 원유(25위), 천연가스(14위) 등에 기반하여 국가재정 수입의 상당부분 충당하고 있음.
- 1980년대 이후 전기전자, 자동차, 석유화학, 철강 등 분야의 외국인 투자를 유치하고 제조업을 육성하는 정책 실시함. 그 결과 반도체, 전자부품, 가전 제품 분야의 글로벌 기업 투자 유치에 성공하였으며 제조업 성장 기반을 마련함. 특히 전기·전자제품은 최대 수출 상품으로 부상함.(2017년 중 총 수출액의 약 36.7%)
- 말레이시아는 장기발전전략으로 'Vision 2020(1990년부터 30년간 매년 7%의 실질 경제성장률 달성을 목표로, 2020년에는 1990년 실질 GDP 대비 8배 성장해 선진국 반열에 오르자)'을 추구하고 있으며, 5년 단위로 중기발전계획을 수립하고 있음.
- 최근 중국·인도 등의 신흥시장국이 급속히 발전하며, 말레이시아의 국가경쟁력이 저하되자 스마트 제조업, 지능형 교통시스템(ITS), 스마트시티, IT·BT(생

명공학) 등의 지식기술 집약산업과 할랄 산업을 기반으로 하여 이슬람 금융, 관광 등 서비스업 분야 육성을 위해서 노력 중임.

- 세계 5위의 수산물 소비 대국(1인당 연간 수산물 소비량 58.6kg, 2017년 기준)이며 높은 소득수준, 도시화, 지리 여건, 문화 다양성 등으로 소비시장 규모가 급속히 확대되고 있음.
- 또한 높은 경제성장률, 한류 확산 등으로 수출 여건이 안정적이기 때문에 동남아시아 시장으로 진출하기 위한 테스트 마켓으로 활용할 수 있으며, 수산물 수출 및 할랄 식품 시장 진출의 교두보가 될 수 있는 매력적인 지역임.
- 특히 한국산 수산물의 경우, 한류 등의 영향으로 고급·고가격 이미지를 갖고 있으며, 수요와 소비가 증가하고 있음. 따라서 수출 확대를 위한 신제품 및 메뉴 개발 등 고부가가치 품목 개발과 상품 차별화 전략이 필요함.
- 말레이시아 통상산업부(MITI) 산하의 자동차·로보틱스·IoT연구소(MARi)에서는 4차 산업혁명(Industry 4.0) 대응정책인 공업 훈련 프로그램 '인더스트리 포워드(Industry-4WRD)'를 개시하였고, 연내 4000명의 인재 육성을 목표로 함.
- 인더스트리 포워드는 4차 산업혁명을 지원하기 위해 투자 인센티브 제공, 통합 디지털 정부 및 제조업 밸류 체인 구축 지원, 부처 간 협업체계 구축, 미래 산업인력 양성, 민·관 협업 플랫폼 및 연구기반 마련 등으로 추진됨.
- 현재 새로운 국가자동차정책(NAP) 안 작성이 현재 최종단계에 들어섰으며, 연내 발표될 것으로 보임. 신 NAP에는 인더스트리 4.0, 차세대 자동차(NXGV), MaaS(이동수단의 서비스화), 인공지능(AI) 등 다양한 최신 산업과 기술 혁신에 대한 미래 비전을 제시하고 있음.

다. 한국과 말레이시아의 교류 현황

- 우리나라와 말레이시아는 1960년 2월 첫 수교 이후 정치, 경제, 문화, 인적 교류 등 여러 분야에서 상호 교류하며 관계를 꾸준히 발전해가고 있음.
- 2019년 상반기 기준 우리나라의 말레이시아 수출은 44.9억 달러, 수입은

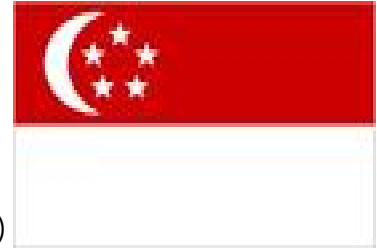
45.3억 달러이며 우리나라의 13위 교역대상국으로 동남아시아 국가 기준 베트남(4위), 싱가포르(12위)의 뒤를 이음.

- 1980년대부터 한국과 일본의 경제발전 사례를 국가 발전 모델로 정하고 '동방정책(Look East Policy)'을 추진하고 있으며, 우리나라와 말레이시아는 매년 다양한 인적 교류 사업을 실시함.
- 말레이시아와의 무역은 1997년 연속으로 무역 흑자를 기록하고 있음. 주요 수출 품목은 철강, 반도체, 정밀화학, 석유제품 등 장치산업 기반의 제품 위주이며 수입은 천연가스, 원유 등 천연 자원이 대부분을 차지함.
- 2009년에는 녹색기술 협력 MOU, 2012년에는 산업협력 MOU를 체결하여 Working Group을 구성·운영 중임.
- 2019년 3월에는 에너지, 유통, 물류 분야 등 양해각서 및 공동연구개발계약(RCA) 3건이 체결됨. 에너지, 산업 등 협력이 한층 강화될 것으로 보이며 정부는 양국 민간 간 경제협력을 위해 적극 지원하겠다는 의지를 보임. 향후 민간 경제활동의 성과로 신남방 정책이 성공적으로 이행되고, 양국의 교역 증대로 이어질 수 있도록 지속적인 노력이 있을 것으로 보임.
- 우리나라와 아세안 국가 간 특별 정상회의가 오는 11월 25일~26일 부산에서 열릴 예정이며, 이를 앞두고 말레이시아와의 자유무역협정(FTA)을 체결하기 위해 협상을 진행하고 있음. 이번 정상회의는 첨단산업 협력을 강화하는 발판이 될 것으로 보임. 또한 한반도의 지속가능한 번영과 평화를 위한 한국과 아세안 국가 간 협력을 강화할 계획임. 그 외에도 이 자리를 통해 양국 스타트업 간 상호 협력과 육성을 위한 생태계 조성에 대한 논의가 이뤄질 것으로 기대됨.

2) 싱가포르

가. 개요

- 인구 5,804,337명 (2019 추계)
- 수도 싱가포르 (Singapore)
- 면적 719km² (세계 189위, 서울의 약 1.2배)
- 공식명칭 싱가포르 공화국 (Republic of Singapore)
- 언어 영어, 중국어, 말레이어, 타밀어
- 정부/의회형태 의원내각제 / 단원제
- GDP USD 3,641억 (2018 추계)



나. 경제 현황

- 싱가포르는 도시국가로 국토 면적이 작고 부존자원이 거의 전무한 지리적 여건을 극복하기 위해 정부 주도의 개방형 경제를 추구함으로써 국제적인 비즈니스 중심지로 발전함.
- 1970년대에는 외국 자본을 이용한 수출 주도형 공업화를 추진하여 높게 성장하였으나 1980년대에 들어 경쟁력이 약화됨. 이에 전자·기계·제약 등 고부가가치 산업을 추진하였으며 제조업과 금융, 물류, 통신 등 제반 서비스가 통합된 세계적인 비즈니스 도시가 될 수 있도록 제조업과 서비스업을 함께 발전시킴.
- 아시아 금융위기 이후 지속적인 성장을 위해 싱가포르 정부는 지식기반 위주의 경제구조 전환을 적극적으로 추진하였으며, MICE(산업·교육·의료 분야의 발전과 관광산업 육성에 심혈을 기울이고 있음.
- 무역자유화 및 외자유치를 통한 세계적인 비즈니스 센터이자 세계적인 교통, 물류, 금융, 원유 거래의 중심지인 싱가포르는 대부분 서비스 중심의 산업구조이나 제조업의 비중도 약 18%를 차지하고 있음.
- 4차 산업혁명 시대에 걸맞은 역동적·혁신적인 경제 개발을 위해 교통, 홈오피스, 헬스케어, 핀테크, 공공서비스 등 전 분야의 스마트화를 주도하는 스

마트 국가 건설 프로젝트를 발표함.

- 싱가포르의 아세안 국가 중 4차 산업혁명 적응도가 가장 높은 국가로 주목 받고 있으며 글로벌 기업 유치, 스타트업 육성 등 기업 친화적인 정책으로 인해 많은 기업들이 싱가포르로 진출하고 있음.
- 2025년까지 세계 최초의 스마트 국가(Smart Nation)를 완성하기 위해 총리실 주관으로 스마트국가플랫폼(SNP), 국가기술청(GovTech), 국가연구재단(NRF), 과학기술연구청(A*STAR) 등이 4차 산업혁명을 적극 추진하고 있음.
- 싱가포르는 '정보통신미디어 2025(Infocomm Media 2025)', '연구·혁신·기업 2020계획(RIE 2020 Plan)' 등 스마트 국가 비전 달성을 위한 마스트플랜을 추진하고 있으며, 지속 가능한 추진기반으로 세계 최고의 스타트업 생태계 유지에 박차를 가하고 있음.

다. 한국과 싱가포르의 교류 현황

- 싱가포르는 동남아시아, 서남아시아, 중동을 연결하는 지리적 요충지로서 동남아 교역의 중심지로 발전함. 우리나라는 싱가포르와 교역, 투자, 건설 부문에서 긴밀한 경제협력 관계를 유지해옴. 특히 건설업계의 교류가 활발하며 창이 국제공항을 비롯한 많은 주요 건물들을 한국 건설사가 건설함.
- 싱가포르는 우리나라의 5대 수출시장이자, 동남아 시장을 담당하는 거점지역으로 무역, 해운·물류, 에너지, 전자, 건설, 금융 등 다양한 분야에서 200여 개 우리 기업들이 현지에 진출하여 활동 중임.
- 최근 우리 정부와 싱가포르는 양국 관계 발전의 토대인 정부와 국민 간의 교류를 정상 차원을 포함해 고위급 인사부터 인재 양성 교류를 확대할 계획임. 또한 양국의 미래를 이끌어갈 청년들과 첨단 과학기술 분야의 우수 인력들의 교류를 넓히고 아세안 공무원 역량강화도 함께 진행하기 위한 '한-싱가포르 공동연수 프로그램'을 발표함.
- 싱가포르는 아세안 국가 중 한국의 제2위 교역국이자 제1위 투자국인 만큼 양국의 상호보완적 경제구조를 활용하고, 2018년 기준 약 200억 달러 수준인 교역 규모를 대폭 확대하며, '이중과세방지협정'의 개정도 조속히 마무리

될 것으로 보임.

- 더불어 최근 양국 공동언론발표에서 4차 산업혁명시대를 함께 준비해 나가기로 발표하였으며, 양국의 우수한 기술력과 자본력을 접목하고 활용할 경우 첨단제조, 인공지능, 빅데이터, 핀테크, 바이오·의료 등의 첨단 분야에서 성과를 거둘 수 있을 것으로 예상됨.
- 중소기업과 스타트업간 협력 확대를 통해 공정한 경제 발전과 미래 국가경쟁력 강화에 도움이 될 것으로 예상됨. 이를 통해 양국 기업이 공동사업을 발굴하고, 제3국에 함께 진출하는 방향도 가능해짐. 또한 양국의 협력 범위는 '신남방 정책'을 포함한 해양안보, 사이버안보, 환경 등 비전통적 안보 분야까지 확대됨.

5 연수 내용

1) 할랄산업개발공사(HDC)

가. 개요

- 기 관 명 : Halal industry Development Corporation
- 방문일시 : 2019년 10월 21일 14:00-16:00
- 설 립 : 2006년
- 홈페이지 : <http://hdcglobal.com/>
- 주 소 : 5.02, Level 5, KPMG Tower, First Avenue, Persiaran Bandar Utama, 47800 Petaling Jaya, Selangor, Malaysia
- 연 락 처 : +60 3 7965 5555
- 면 담 자 : Acting Chief Executive Officer Mr. Hairol Ariffein Sahari



나. 연혁

- Halal Industry Development Corporation Sdn Bhd(말레이어 : Perbadanan Pembangunan Industri Halal)는 말레이시아 국제무역 산업부 산하기관인 HDC의 소속으로 국가 할랄 산업의 통합 및 종합 개발을 보장하기 위한 말레이시아 정부의 실행기관.
- 말레이시아 할랄 표준 개발에 중점을 두고 있으면 할랄 제품의 브랜딩 및 홍보 등 할랄 제품 및 서비스의 상업적 개발에 중점을 둠.
- 최고 경영자는 Hairol Ariffein Sahari으로 공식적으로 2006년 9월 18일에 설립하였으며, 말레이시아가 할랄 산업의 Global Halal hub가 되겠다는 비전을 실현하고 할랄 표준으로 삼는 핵심 사명에 중점을 둔 전담조직으로 설립됨.
- 2011년 JAKIM(Department of Islamic Development Malaysia, 말레이시아

이슬람개발국)과 파트너십을 시작하여 중소기업이 JAKIM의 할랄 인증서를 신청할 수 있도록 중소기업에 교육 및 컨설팅을 제공함.

- 2013년 10월, HDC는 중소기업은행 및 Bumiputera Agenda Steering Unit과 RM280 million 할랄 개발 기금 설립을 위한 양해각서에 서명했으며, 이 기금은 말레이시아의 할랄 산업과 할랄의 국제화를 위해 제공됨.
- DAFZA(Dubai Airport Freezone Authority)는 말레이시아 할랄산업개발공사(HDC)와 양해각서(MOU)에 서명했다. 이에 따라 두바이 등 아시아권의 할랄 개발 프로세스를 지시 및 지원하며, UAE와 말레이시아 간의 투자를 지원하고 아시아권의 할랄 산업의 선두 기관으로 자리매김함.



다. 주요내용

- HDC는 말레이시아 할랄 산업의 종합 개발을 조정하는 세계 최초의 정부 지원 할랄 산업 개발 회사임.
- 할랄은 품질, 건강, 위생, 안전 등을 위한 새로운 벤치마킹으로 인식되고 있음. 많은 국가들이 글로벌 할랄 아젠다에 참여하는 것에 많은 관심을 보이며, 국가 전략으로 할랄을 채택하고 있음.
- 할랄 시장에 진출하기 위해 말레이시아의 할랄 기준을 채택한 많은 다양한 세계 기업들이 말레이시아에 입주해 있음.

- 할랄 표준 개발, 감사 및 인증, 할랄 제품 및 서비스의 역량 강화에 중점을 두고 전 세계 할랄 시장에서 말레이시아 기업의 참여와 성장을 촉진함.
- 할랄 인증은 위생 및 청결도 기준 준수, 제품 취급 절차에서 안전 및 청결성 보장, 원료의 할랄 상태 보장 등에 대한 평가 절차를 통해 부여됨. 인증 분야는 음식, 채소, 생필품, 화장품 이외에도 식당, 제조공장, 의약품, 물류, 도축장 등 다양하게 이뤄지고 있음.
- HDC는 말레이시아의 경험과 식품 및 비식품 분야의 전문 지식을 제공함으로써 제조업, 유통업, 소매업 등의 기업과 연구원, 투자자에게 할랄 시장 진출에 필요한 지원업무를 담당함.
- 말레이시아에 위치한 14개의 할랄 전문공업단지 '할랄 파크'의 분양 및 개발 등을 중점으로 추진하여 할랄 산업 분야에 외국인의 투자가 이뤄질 수 있도록 지원함. HDC 소속의 '글로벌 할랄 서포트 센터'에서는 할랄에 관한 다양한 정보를 제공하고 지원 활동을 진행 중임.

라. 질의응답

- 할랄은 위생과 영양을 중요시한다는 것을 설명했는데, 그렇다면 할랄과 할랄이 아닌 것의 구분은 위생과 영양에 따라 하는가, 종교에 따라 하는가?
 - 물론 종교적인 문제가 먼저다. 하지만 할랄 표준에 따라 안전성과 청결도를 유지해야 하기 때문에, 만약 할랄 레스토랑에 간다면 깨끗하게 유지되고 있을 것이기 때문에 안심해도 될 것이다. 종교적인 이유도 있지만 건강한 삶의 방식으로 바꾸고 싶다면 할랄 요법도 신선한 방법이 될 것이다.
- 말레이시아에서 할랄에 대한 인식은 자발적인 것인가?
 - 할랄은 종교적이기 때문에 함부로 이용하지 않고, 정부에서 강요하지도 않는다. 최근에는 자발적으로 인증 받는 경우가 많아졌다. 인증을 통해 믿음과 품질을 보장할 수 있기 때문이며, 이에 대한 교육 및 컨설팅 프로그램

을 실시하고 있다.

○ 할랄은 특정 종교의 식품이고, 엄격한 기준을 갖고 있기 때문에 사업 확장성에 한계가 있다. 그렇다면 시대 흐름에 맞춰 기준을 유연하게 적용할 수는 없는지?

- 믿음을 형성하고 오랫동안 기준을 이어가려면 유연함보단 엄격하게 관리하는 것이 중요하다고 본다. 원재료뿐만 아니라 공장 시스템에 조금이라도 문제가 발생하면 소비자들이 이야기 할 수 있고, 이러한 정보들은 쉽게 공유될 수 있는 사회이다. 그렇기 때문에 할랄 인증을 받는 것은 어려울 수밖에 없다.

연수 사진



2) 말레이시아 국립생명공학원(NIBM)

가. 개요

- 기 관 명 : National Institutes of Biotechnology Malaysia
- 방문일시 : 2019년 10월 22일 10:00-12:00
- 설 립 : 2005년
- 홈페이지 : <https://www.nibm.my/>
- 주 소 : No 23, Jalan Tunku Abdul Rahman, Presint 3, 62100 Putrajaya
- 연 락 처 : +60 3 8949 5600
- 면 담 자 : Chief Innovation Officer MR. AZMAN BIN ABD RAZAK



나. 연혁

- NIBM은 IPHARM(Malaysia Institute of Pharmaceuticals & Nutraceuticals), ABI(Agrobiotechnology Institute Malaysia), MGI(Malaysia Genomic Institute) 등 3개 국가생명공학연구소의 컨소시엄으로 구성.
- NIBM은 2012년 1월 27일 IPHARM, ABI 및 MGI를 관리하기 위한 자율적 비영리 단체인 CLG(Company Limited by Guarantee)로 설립.
- 2006년 말레이시아 국가 아젠다로 바이오 생명공학 분야를 설정하고 발전을 위해 MOSTI가 감독하는 정부 기관으로 2006년에 IPHARM, ABI 및 MGI 설립.
- 2012년 내각은 IPHARM, ABI, MGI를 새로운 자율적 비영리기관으로 조직화 하여 3개 기관을 보다 효율적으로 중앙에서 운영할 수 있도록 의결하고, 이 기관은 National Institutes of Biotechnology Malaysia(NIBM)로 지명.
- 2014년 3월 1일 ABI, IPHARM 및 MGI가 공식적으로 NIBM으로 전환.



다. 주요내용

- 농업·생명·식품 분야 연구기관인 ABI(말레이시아 농업생명공학원), 유전분자 분야 연구기관인 MGI(말레이시아 유전체연구원), 제약 및 영양 분야 개발연구기관인 IPHARM(말레이시아 식품의약연구원)으로 구성됨.
- 말레이시아에 위치한 연구소들은 각각의 특정 분야의 R&D에 중점을 두지만, NIBM은 기술개발을 주요 목적으로 생각함. R&D 활동의 우선순위와 방향을 설정하고 R&D 결과물 상용화 계획을 도출하며 네트워킹 및 협업을 진행하고 있음.
- 주요 목표는 IPHARM, ABI, MGI가 정부 절차상의 요구 사항을 최소화하거나 제거함을 통해 역동적이고 신속하며 효율적인 의사 결정 프로세스를 구축하는 것임.
- 연구개발 활동의 우선순위와 방향 설정, 연구개발 산출물의 상용화 계획 수

립, 말레이시아를 글로벌 생명공학의 허브로 이끌 수 있는 연구개발 생태계 고도화를 위한 활동을 하고 있음.

- 현재까지 164개 R&D 진행, 75개 지적재산권 보유, 871개 출판물 발간, 27개 제품 개발 등의 성과를 이룸.
- 연구 성과를 바탕으로 기업 및 스타트업과 협력해서 기술이전 및 사업 컨설팅 서비스를 진행하고 있음. 또한 제품 개발 지원을 위해 연구시설 및 장비를 공유하고 전문가 양성을 위한 교육프로그램과 인턴십을 제공하고 있음.
- 말레이시아의 산업과 연계된 연구 프로그램, 기술 자원의 우수성 및 중소기업 상용화 센터의 효율성을 적시에 구축함으로써 세계적으로 경쟁력을 가지는 생명공학산업 창출을 목표로 함.
- NIBM의 역할은 R&D활동의 우선순위와 방향을 설정하고, R&D 결과물의 상업화를 계획하고, R&D 생태계를 강화하여 말레이시아를 글로벌 생명 공학 허브로 육성하는 것임.
- 국가 생명공학의 발전을 위해 국가 생명공학 정책 및 이니셔티브를 구현하는 클러스터 개념을 도입하고 말레이시아 생명공학의 세계적 허브역할과 말레이시아의 미래 산업으로 육성하는 핵심 연구기관이 되고 있음.

라. 질의응답

○ 여러 가지 사업을 진행 중인데, 이는 연구원 자체 기획으로 진행하는 것인가, 정부 요청에 의해 진행하는 것인가?

- 자체 기획도 있고 정부의 요청으로 진행하는 프로젝트들도 있다. 자체적으로 다양한 기술을 보유하고 있기 때문에 정부의 지원 요청이 들어오면 해당 산업에 대한 훈련, 기술·시설 지원 등을 실시하고 있다.

바이오기술 분야 연구원과 관련 산업 분야 전문가들이 모여 문제점을 공유하고 해결방법을 논의하는 자리가 있는데, 그 과정에서 정부도 함께 참여하여 문제의 우선순위를 정해 프로젝트를 진행한다. 연구비용은 정부에서

일부 지원해주며 산업 분야에 따라 다르다. 그 외에도 NIBM에서는 각 지방정부를 방문해 산업별 문제점을 공유하고 해결책을 제공해주는 로컬 프로그램도 진행하고 있다.

○ 개발되는 제품들도 할랄 인증을 받는 것인가?

- 연구개발 단계의 제품은 별도의 인증을 받지 않으며, 상업화되고 실제 제조되면 제조사 측에서 할랄 인증을 받게 된다. 하지만 연구개발 과정에서 사용하는 원재료 등은 대부분 할랄 제품을 사용한다.

○ 많은 사업들을 진행하고 있는데, 우선순위를 어떻게 결정하고 관리하는가?

- 우선순위 측정 시 자금 확보, 관련 문제의 심각성, 사업의 필요성(국가적으로 필요한지, 일부 산업에 국한된 것인지) 등을 검토한다.

연수 사진



3) 주택개발청(HDB)

가. 개요

- 기 관 명 : The Housing & Development Board
- 방문일시 : 2019년 10월 23일 14:00-16:00
- 설 립 : 1960년
- 홈페이지 : <https://www.hdb.gov.sg/>
- 주 소 : HDB Hub, 480 Lorong 6 Toa Payoh, Singapore 310480
- 연 락 처 : +65 6490 1111
- 면 담 자 : Corporate Communications Manager Ms. Lui Wen Qing



나. 연혁

- 주택개발청(HDB)은 싱가포르의 공공주택을 책임지는 국가 개발부 법정위원회로, 1960년대 싱가포르의 빈민가와 빈민가를 정리하고 주민들을 저렴한 주립 주택 제공을 목표로 설립됨.
- 1959년 자치정부를 달성한 직후 싱가포르는 심각한 주택부족 문제에 직면함. 1959년 선거 운동에서 민중행동당(PAP)은 주택에 대한 긴급한 관심을 필요로 한다는 것을 인식하고 선출되면 저비용 주택 제공을 약속함.
- 선거에서 승리하고 새로 선출된 정부가 구성되자, 주택난을 해결하기 위해 즉각적인 조치로 정부는 기존 싱가포르 개선신탁을 주택개발위원회로 대체한 1960년 주택개발법을 통과시키고 HDB를 설립함.
- 1960년대 HDB는 많은 주택을 단시간에 공급하기 위해 저비용 주택을 건설하는 것을 목표로 5년 계획을 실시하였으며, 초기 주택은 임대아파트로 시작함. 1964년 이후 자가 소유 정책을 도입함.
- 1970년대에 들어서며 단순한 주택 공급을 넘어 여러 편의시설을 도입한 단지를 조성하기 시작함. Toa Payah는 공공시설 등이 함께 계획된 첫 번째 단지임.

- 1980년대와 1990년대로 넘어가며 사람들의 주거에 대한 기대수준이 높아지기 시작하자 건축 및 주거환경의 질과 지역 커뮤니티를 고려한 아파트 단지를 개발함.
- 2000년대 이후 최신 라이프 스타일, 재생에너지, 친환경 설계 등을 반영한 지속가능한 타운 개발을 진행하고 있음.



다. 주요내용

- 주택 및 도시개발을 담당하고 있는 싱가포르 국토개발부 산하 공공기관으로 URA(Urban Regeneration Authority, 도시개발국)가 수립한 마스터플랜에 따른 구체적인 주택 공급 및 도시개발 방향을 수립하고 시행.
- 타운 개발 과정은 먼저 해당 지역에 대한 자료 수집을 통해 지역의 특성을 이해하고 주변 상황과 다른 지역과의 연계성 등을 고려하는 것부터 시작함. 이렇게 수집된 정보를 분석해 지역의 장점과 단점을 도출하고 그에 맞는 비

전과 목표를 설정하게 됨. 이를 기준으로 여러 정부기관이 협력하여 단순한 주택 제공이 아니라 교통, 교육, 보건 등을 반영한 계획을 수립하고 정부 승인 후 개발을 실시함.

- 타운 형성 후 거주민의 의견을 수집하고 피드백 과정을 거침으로써 새로운 계획을 수립할 때 이러한 의견을 반영하는 순환 과정을 거침.
- 설립 이후 50년 이상이 지나도록 수많은 현지인들을 위해 수준 높고 저렴한 공공주택을 제공하여 주택문제 개선에 큰 기여를 하고 있음.
- 현재까지도 지속적인 신규 주택 건설 및 기존 주택 리모델링 등의 사업을 수행하고 있고, 현재 80%가 넘는 싱가포르인이 HDB가 건설한 공영아파트(HDB flat)에 거주.
- 현재 24개의 타운이 형성되어 있으며, 각각의 타운들은 교통망을 통해 연결되도록 계획됨.
- 주택 및 도시개발 사업의 구체적인 시행 방향을 세워 모두를 위한 양질의 주거환경 향상, 주택의 개수와 보수, 지속 가능성 확보, 이웃과의 유대감을 위한 커뮤니티 활성화 등을 제시.
- 도시계획, 도시 디자인 등 시민들의 삶의 질 개선과 주거환경을 개선하는 동시에 커뮤니티도 보전할 수 있도록 유도하는 방안 등을 시행하여 글로벌 도시국가로서의 의미 있는 도시계획의 실행과 보전의 역할을 하고 있음.
- HDB의 단지계획 기본원칙으로는 ①일·주거·업무·여가·교육 등 일상생활이 가능한 자족도시 계획, ② 근린주구 개념을 도입한 걸어 다닐 수 있는 단지 조성, ③ 체계적인 시설 계획, ④Transport Hub를 통한 교통망을 구축하여 지역 간 연계, ⑤Checkerboard 개념을 도입한 고층 건물과 저층 건물이 조화를 이루는 도시경관 형성이 있음.
- 5개 원칙 외에도 최신에는 새로운 요소들을 도입하고 있으며, 경제·사회·환경적으로 지속가능성을 고려한 설계, 스마트시티 기술을 접목한 편리한 정주공간 조성, 자연과 조화를 이루는 에코시티 계획 등이 이뤄지고 있음.

라. 질의응답

- 재개발이나 재건축을 진행할 경우 기존 주민들의 이주 보상은 어떻게 이뤄지는가?
 - 주민들에게 현재 아파트의 공시지가를 현실적으로 반영해서 보상하고, 이주지원금을 정부에서 추가로 지급해 현재와 비슷한 거주환경으로 이주할 수 있도록 하고 있다. 재개발, 재건축에 대해서는 정부 소유의 아파트이기 때문에 주민들의 반발은 별로 없다.
- 우리나라의 경우 한 단지에도 소득계층 차이로 발생하는 문제가 있는데, 다양한 민족과 소득계층이 있는 싱가포르의 경우 어떻게 모두가 어울려 살 수 있는 환경을 만드는가?
 - 우선 인종이나 문화적인 차이는 정책적으로 해결한다. 한 단지에 중국계인이 70% 이상 거주할 수 없도록 인종쿼터제를 실시하고 있으며, 도시계획적으로는 인종이나 문화에 상관없이 함께 어울릴 수 있는 문화공간을 조성하고 있다. 또한 소득차이의 경우 HDB는 모두가 살 수 있는 주택 공급을 하고 있기 때문에 거주민 간 소득격차에 따른 차별은 없다. 만약 소득이 높은 경우, 공공주택이 아닌 민간주택에서 살기 때문에 한국만큼 소득계층에 따른 문제가 발생하진 않는다.
- 싱가포르의 미래 주택정책은 무엇이며, 어떻게 준비하고 있는가?
 - 1971년에 도입된 이후로 10년마다 수립되는 Concept Plan에 싱가포르의 미래 예측과 그에 대한 계획을 담고 있다. 기존 지역을 어떻게 재개발할 것인가에 대해서는 한국처럼 싱가포르 또한 고민하고 논의하는 문제이다. 이 과정에서 중요하게 생각하는 부분이 Pocket, 공지를 지역 내에 확보하는 것이다. 토지이용의 유연성을 확보하고 재개발 시 다양한 활용이 가능하도록 지역 내 Pocket을 확보함으로써 재개발시 주민들의 불편을 최소화하기 위해 노력 중이다.

연수 사진



4) 과학기술연구청(A*STAR)

가. 개요

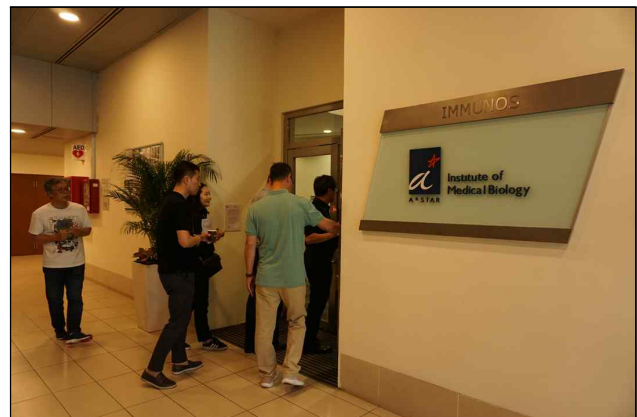
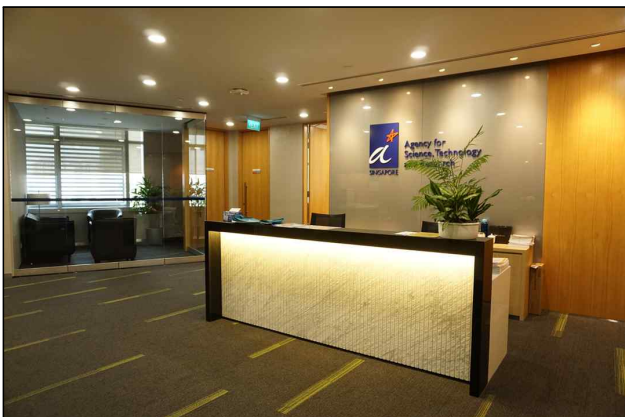
- 기 관 명 : Agency for Science, Technology And Research
- 방문일시 : 2019년 10월 24일 14:00-16:00
- 설 립 : 1991년
- 홈페이지 : <https://www.a-star.edu.sg/>
- 주 소 : 1 Fusionopolis Way, #20-10 Connexis North Tower, Singapore
- 연 락 처 : +65 7672 6100
- 면 담 자 : Biomedical Research Council Mr. Samantha Liew



나. 연혁

- A*STAR(Agency for Science, Technology and Research)는 싱가포르 무역산업부 산하의 과학기술 연구기관임.
- 이 기관은 싱가포르의 과학연구의 지원 및 국가적 과제의 R&D를 지원함.
- 싱가포르 정부는 'RIE2020'이란 5년 단위 연구과제 펀딩을 진행하고 있으며, 이는 AME(Advanced Manufacturing and Engineering), HBMS(Health and Biomedical Sciences), SDE(Services and Digital Economy), USS(Urban Solutions and Sustainability) 등 4가지 분야로 나뉘짐. 펀딩 프로그램은 학계 연구, 인력, 기업혁신 분야에서 이뤄지고 있음.
- 이 기관 소속 연구소는 대부분 바이오폴리스(Biopolis)와 퓨저노폴리스(Fusionopolis)에 있음. 과학자 및 연구원, 기술 및 비기술 직원, 산업개발 및 상업화 직원을 포함한 A*STAR 기술연구개발 인력은 약 5,600명임.
- A*STAR는 1991년 1월 11일에 지식 집약적 생물의학, 연구, 과학 및 공학 분야를 성장시켜 경제발전과 싱가포르의 미래기술 성장을 주요 임무로 설립.
- A*STAR의 생의학연구소 및 센터는 Novartis, Danone, Abbott 및 Procter & Gamble과 같은 회사의 기업 연구소와 함께 바이오폴리스에 있음.

- 특히 생물의학 부문은 바이오폴리스와 함께 성장하면서, 2000년대에는 싱가포르의 제조업 부가가치에 10%를 기여했으며, 2017년 생의학 제조는 총 제조 부가가치 19.6%으로 두 번째로 큰 역할을 하고 있음.
- A*STAR는 과학 및 엔지니어링 연구 기능을 통합하고 공공과 민간 부문 간의 긴밀한 협력을 촉진하는 싱가포르의 과학연구 최대 기관이자이자 아시아 최고 연구기관으로 성장하고 있음.



다. 주요내용

- 싱가포르 미래 비전의 국가적 요구에 맞는 연구개발을 지원하는 총괄기관으로 경제 성장, 삶의 질 향상을 위한 과학기술 및 혁신기술 개발을 목표로 추구하고 있음.
- A*STAR의 활동영역은 크게 Biomedical Research Council(BMRC), Science&Engineering Research Council(SERC), A*ccelerate, A*STAR Graduate Academy 등 임.
- 세계 수준의 연구 전문 기술을 바탕으로 솔루션을 신속하게 제공하고, 이러한 기술을 통해 모든 생산자의 산업 생산 능력의 이익으로 이어질 수 있도록 기반 시설을 갖추고 있음.
- 생산성 향상을 위해 결함을 제거하고 오류를 줄이는 첨단 기술을 개발하여 지역 기업을 지원하고 제후를 맺음. 또한 기업의 성장을 위해 R&D 중심의 스타트업을 육성함으로써 최상의 역량을 확보하고 있음.

- 여러 연구기관들과 공동실험, 공동개발, 공동 프로젝트를 진행하는 등 개방형 기술혁신(Open innovation)을 함으로써 공공 및 민간 부문의 파트너와 협력하고 과학기술 분야의 글로벌 네트워크를 형성함.
- 기술 및 연구개발 인재 육성을 위한 연구 프로그램을 지원하고 제공하는 싱가포르의 과학연구 개발의 핵심 싱크탱크 역할을 함.
- A*STAR의 인력개발 주요 전략은 싱가포르의 연구 인력을 강하게 결집하는 것이며, 이 외에도 국제적인 연구자들과 함께 다양성을 유지하는 것을 중요하게 생각함.

라. 질의응답

- 싱가포르 바이오 분야에 대한 민간 지원이 많은 것 같은데, 연구 활동은 민간 주도로 진행되는가?
 - 정부 주도로 과학기술 분야에 발 빠르게 대처해 연구 활동이 이뤄지고 있다. 다만 최근 정부 차원에서 민간 기업에 대한 지원을 강화하고 있다. 벤처기업, 스타트업과 협력하고 이들이 성장할 수 있도록 지원한다.
- 싱가포르의 향후 주력 산업으로써 집중하는 분야는 무엇인가?
 - 크게 2개 분야로 하나는 바이오메디컬 분야로 Scientific platform을 위주로 진행 중이며, 다른 하나는 Science engineering 분야로 제조 산업에 개인 맞춤형 상품화가 가능한 Hyper-Personalization에 대해 연구 중이다.
- 다양한 연구를 진행 중인데, 과제를 수행하는데 있어서 성과를 높이기 위한 특별한 동기 부여나 평가 방식을 갖고 있는가?
 - 평가 시 프로그램과 연구기관을 나눠서 평가한다. 프로그램의 경우 Industry Alignment Fund를 받고 있기 때문에 성과지표 평가를 실시하며, 프로그램 기간 중간에 성과에 대한 중간 점검을 갖는다. 소속 11개 연구기관은 각 분야에 맞는 별도의 성과지표를 설정해 평가하고 있다.

연수 사진



6 연수 소감

1) 할랄산업개발공사(HDC)

- 이슬람 문화권과의 상업교류나 농식품 분야 직·간접 진출에 유용한 협력이 가능한 파트너가 될 수 있음.
- 이슬람 식문화를 국가 차원에서 하나의 산업으로 개발시켜 전통식문화를 투명하고 깨끗하면 수익창출에 부여했다는 점에 인상 깊음.
- 이슬람 식문화에 대한 이해도를 높일 수 있었으며, 앞으로 우리나라에서의 이슬람 식문화 발전방향에 대한 깊이 있는 논의의 밑바탕이 되는 계기가 되었음.
- 할랄 문화에 대한 우리 스스로의 이해도를 더욱 높일 필요가 있으며 할랄의 수용 태세를 정부차원에서의 고민도 필요함.

2) 말레이시아 국립생명공학원(NIBM)

- 풍부한 자연자원을 가진 말레이시아의 농식품·바이오 분야 연구 개발 동향 청취 및 한국 지자체와의 협력가능성에 높은 가능성이 보임.
- 국가 주도의 생명공학, 환경개발, 연구정책이 어떠한 과정과 절차를 통해 개발·시행되고 있는지 확인할 수 있었으며, 연구개발뿐만 아니라 다양한 분야의 사업영역 확장도 인상적이었음
- 말레이시아 생명공학 분야의 정부 연구기관으로 한국의 바이오 산업관련 연구 또는 정부 대 정부, 기관 대 지방의 공동연구로 진행한다면 효과가 극대화 될 가능성이 있음.

3) 주택개발청(HDB)

- 과거 우리나라의 주택공사(현 LH)와 유사한 모델로, 정부 주도 도시 개발의 효율성에 대한 유용한 사례임.
- 우리나라는 소득주도 성장에 따라 소득이 많은 사람들이 주택 혹은 아파트 구입에 우위를 차지하는 반면, 싱가포르의 모든 국민이 주택을 소유할 수 있도록 제공하고 주민들의 삶의 질을 높이기 위해 지속적으로 주민의 의견을 반영하는 정책 시행이 인상 깊음.
- 최근 우리나라에서도 이슈가 되고 있는 주택정책에 대한 시사점을 확인할 수 있었으며, 주택정책은 각 국가의 문화적 요소도 크게 영향을 주는 것으로 우리나라의 합리적 정책방향의 대안이 될 수 있는 사례라 생각됨.
- 주거생활의 안정을 위해 국가의 기능화, 정책적 사회변화에 대응한 주택지 개발 및 공급이 필요함을 느꼈음.
- 국내와 여건의 차이는 있지만 국토 전체에 대한 체계적 관리 및 계획, 이행시스템의 활용에 대한 고민이 필요함.
- 광역 단위 지자체의 도시공사, 관광공사 등이 HDB의 역할을 수행할 수 있도록 도시, 지역개발, 산림, 디자인, 경관 등 협업 조직을 강화할 필요성이 있음.

4) 과학기술연구청(A*STAR)

- 바이오 분야의 공동연구, 벤처기업의 세계시장 진출에 참고가 될 수 있는 싱가포르 협력기관임.
- 외국기업임에도 불구하고 싱가포르 정부의 지원을 받고, 연구 인프라

를 활용하여 빠른 성장을 할 수 있다 점이 인상 깊음.

- 정부 주도 연구개발을 통해 신산업, 과학기술 분야에 효율적인 투자가 이뤄지고 있었으며, 우리나라와의 향후 교류가 기대됨.
- 싱가포르의 과학기술 R&D를 지원하고, 연구개발 이외도 제휴/협력을 통한 과학기술의 네트워크 역할과 스타트업을 지원하는 인재교육 프로그램 등은 한국과 교류한다면 많은 유용한 결과가 나올 것으로 생각됨.
- 기술관련 창업 지원을 위한 인프라를 구축하고, 국제적인 시점에서 지원하는 역할은 우리나라에서도 활성화되어야 함.
- 체계적인 창업 생태계가 조성되어 있다는 것이 놀라움. 지자체에서도 특정분야에 대한 체계적 기술개발, 창업생태계 여건을 조성할 필요가 있음.
- 기술개발, 보급, 교육 등의 일원화된 시스템 등 국가적인 연계성에 있어 시사점이 있음. 특히 아이템만 있으면 생산이 가능하도록 국가적 지원을 해주는 지원시스템에 대해 우리 또한 고민이 필요함.
- 과학기술 산업의 핵심은 "인재" 이라는 것을 새삼 깨닫게 했으며, 인재 육성에 더욱 많은 노력이 필요하다고 생각함.

부 록

- 방문기관 참고자료 -

1. 할랄산업개발공사(HDC)
2. 말레이시아 국립생명공학원(NIBM)
3. 주택개발청(HDB)
4. 과학기술연구청(A*STAR)

1

할랄산업개발공사(HDC)



The Idea of Halal and Thoyyib

HDC

Halal and Thoyyib – The underlying principle for a Muslim diet

Products has to be:



2

The changes in global Halal landscape today attracted many countries intensifying its effort in developing its Halal Industry

HDC



Halal is fast becoming recognized as a **new benchmark for quality, healthy, hygiene and safety.**

Many countries have expressed their strong interest in participating in global Halal agenda and have now adopted Halal as their national strategy



A paradigm shift **from a Halal niche strategy to mass marketing** of Halal products/services leveraging on **borderless e-commerce platform**

Developing the main artery of the global Halal pipeline could be challenging and normally this problem can be circumvented through a **Government-to-Government initiative.**

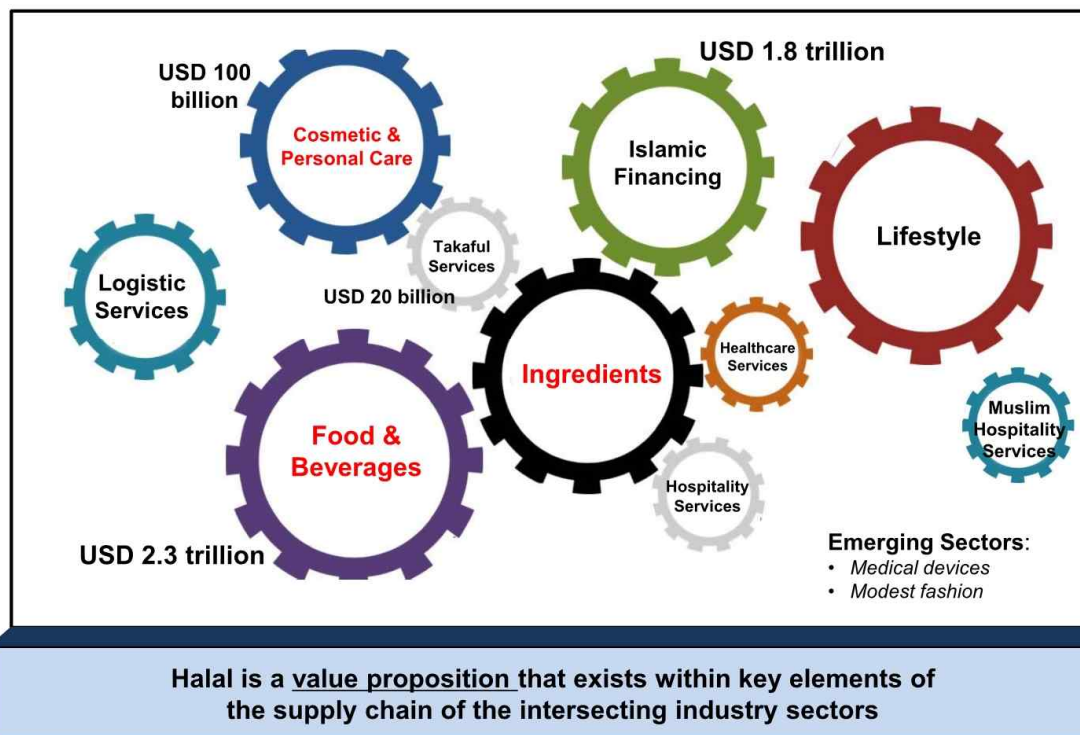


The growth in Halal Industry is phenomenal

3

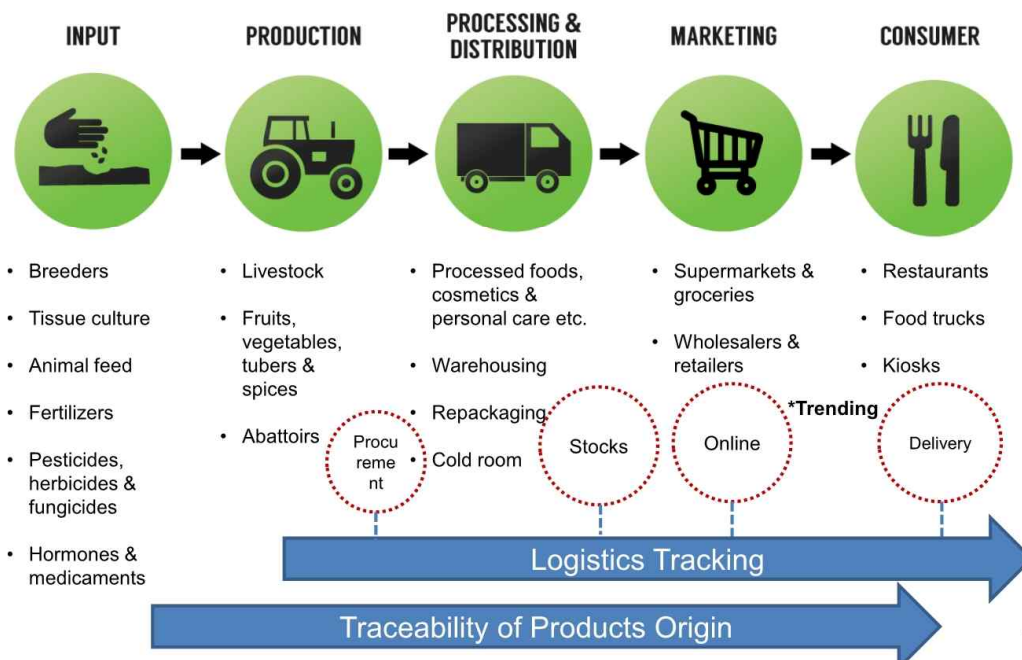
Halal is diverse - halal is not just confined to food

HDC



HDC

2



HDC

[illegible]

Ascorbyl
Palmitate

Riboflavin

Sodium
Selenate

Cyancobalamin



Triisostearin

Phenoxyethanol

Methylparaben

INGREDIENTS
Aqua, Cycloheximide¹, Mica,
Polybutene-1, Trisostearin,
Prunus Persica flower Extract,
Betula Alba Oil,
Lavandula Officinalis Oil,
Paraffinum Liquidum,
Spermaceti Carbonate,
Methylparaben, Ethoxycetylalcohol,
Propylparaben, Lecithinum Ascorbicum
Denat., BHT, Parfum², Aroma³,
Cinnamyl Alcohol, Citronellol,
[+/- CI 15580⁴, CI 45430⁵]

Ingrediënten: 91% room
(E941, E942), emulgator
natuurlijk vanillearoma

EJEN ANTIKERAKAN ("ANTICAKING AGENTS")		
Untuk mengelakkan makanan dari menjadi keras dan supaya mudah dituang misalnya tepung		
BERASAL DARI TUMBUH- TUMBUHAN		BERASAL DARI HAIWAN
E500	E529	E542
E501	E535	E570
E504	E551	E572
E507	E552	
E509	E558	
E511	E559	
E515	E575	
E516	E577	
E518	E578	
E519	E579	
E526	E585	

PELAZAT ("FLAVOUR ENHANCERS") Untuk menambah kelazatan makanan	
BERASAL DARI TUMBUH- TUMBUHAN	BERASAL DARI HAIWAN
E623	E620
E624	E631
E625	E635
E636	E640
E637	

EJEN PENGILAT, PEMANIS ("GLAZING AGENTS, SWEETENERS") Untuk mengkilatkan makanan, memmaniskan makanan	
BERASAL DARI TUMBUHAN	BERASAL DARI HAIWAN
E900	E901
E925	E904
E926	E905
E931	E907
E932	E913
E957	E920
E965	E921
E967	E951
E999	E1100
E1200	E1518
E1201	
E1202	
E1400-E1450	
E1517	

Malaysia as a destination for halal investment

HDC



- Make Malaysia as Halal Centre of Excellence for Nestle world wide – reference for 85 halal certified factories all over the world (Total 436 Nestle factories globally).

- Spur the development of local halal vendors



- Regards Malaysia an important Hub for Halal to serve its customers in more than 70 countries

- Taking full advantage of abundant halal raw materials (palm oil based) in Malaysia



- "World first Halal Vaccine production facility in Malaysia"

Other main brands manufactured in Malaysia:



and more ...

Investment

More investors are invited to set up its potential Halal production facilities in Malaysia preferably in Halal Parks

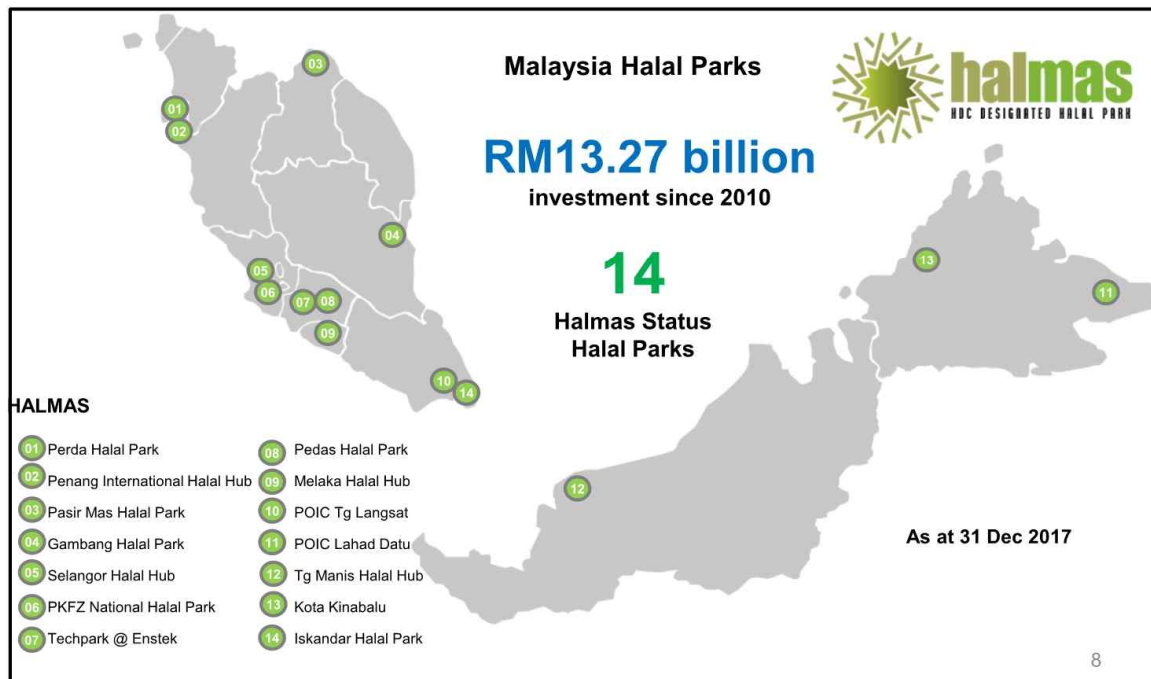
Main incentives for Halal Industry Players:

- Full income tax exemption on qualifying capital expenditure for a period of 10 years; or Income tax exemption on export sales for a period of 5 years
- Exemption on import duty on raw materials used for the development and production of halal promoted products
- Double deduction on expenses incurred in obtaining international standards such as Hazard analysis and critical control points (HACCP), Good Manufacturing Practice (GMP), etc.

HALMAS Designated Halal Parks in Malaysia

HDC

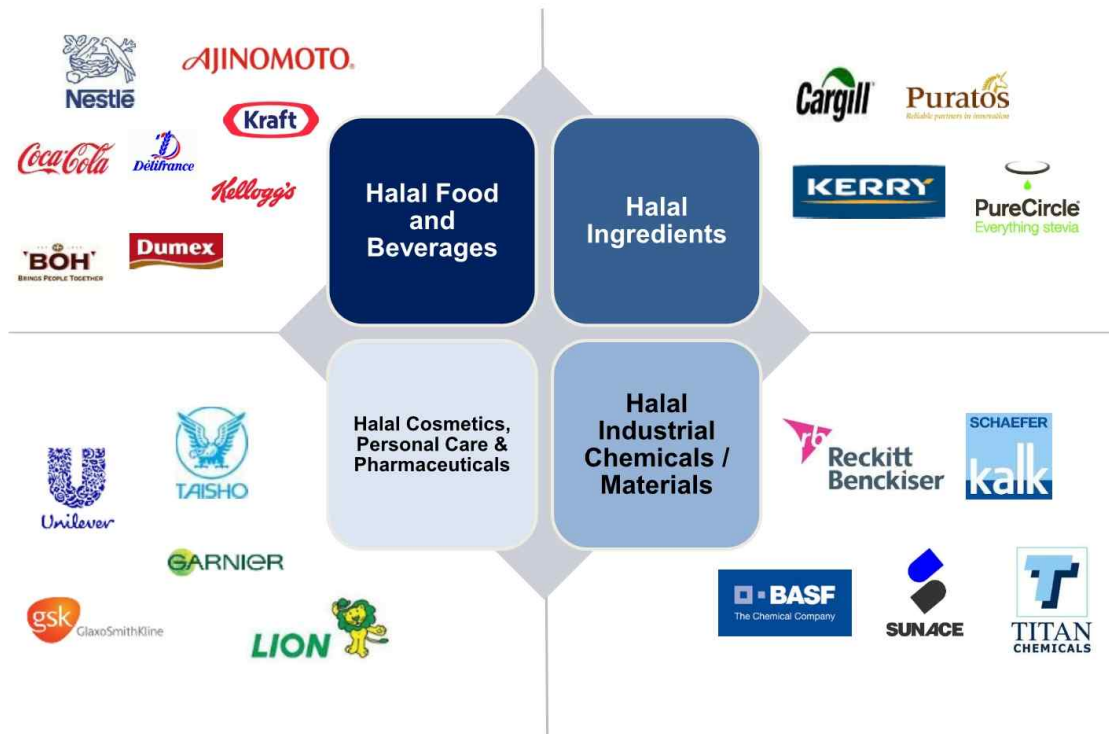
Tenants within the halal parks form a community of manufacturing and services businesses with a mutual goal of achieving economic benefits while preserving halal integrity. The goal of the Halal Park is to allow participating companies to improve their economic performance



8

Investment – Malaysia is a home for various international brand adopting Malaysia's Halal standard to penetrate Halal market

HDC

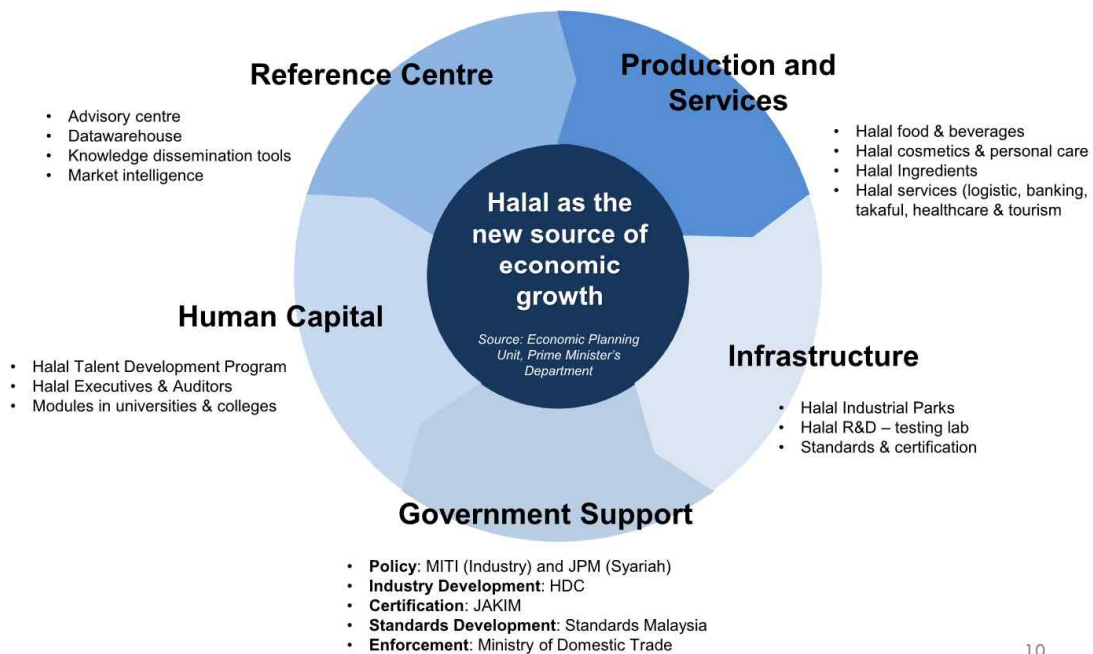


Malaysia's halal ecosystem

HDC



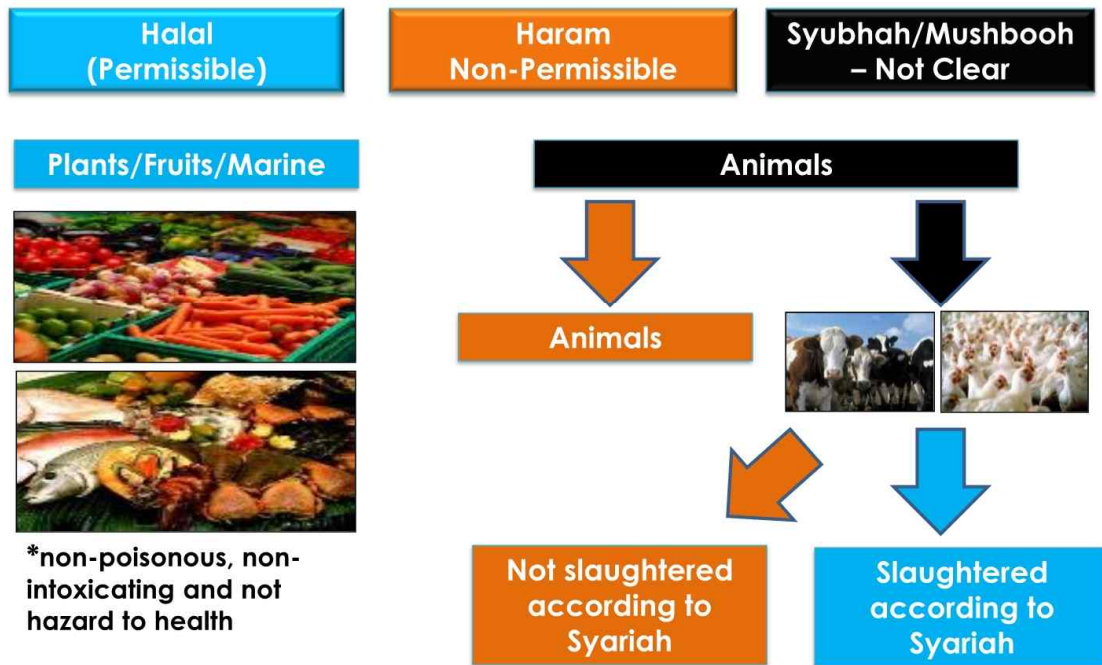
Various halal sectors co-exist and supported by proper policy, legislation, halal integrity management and industry development connecting the Government, industry players and consumers



10

Halal vs Assumption

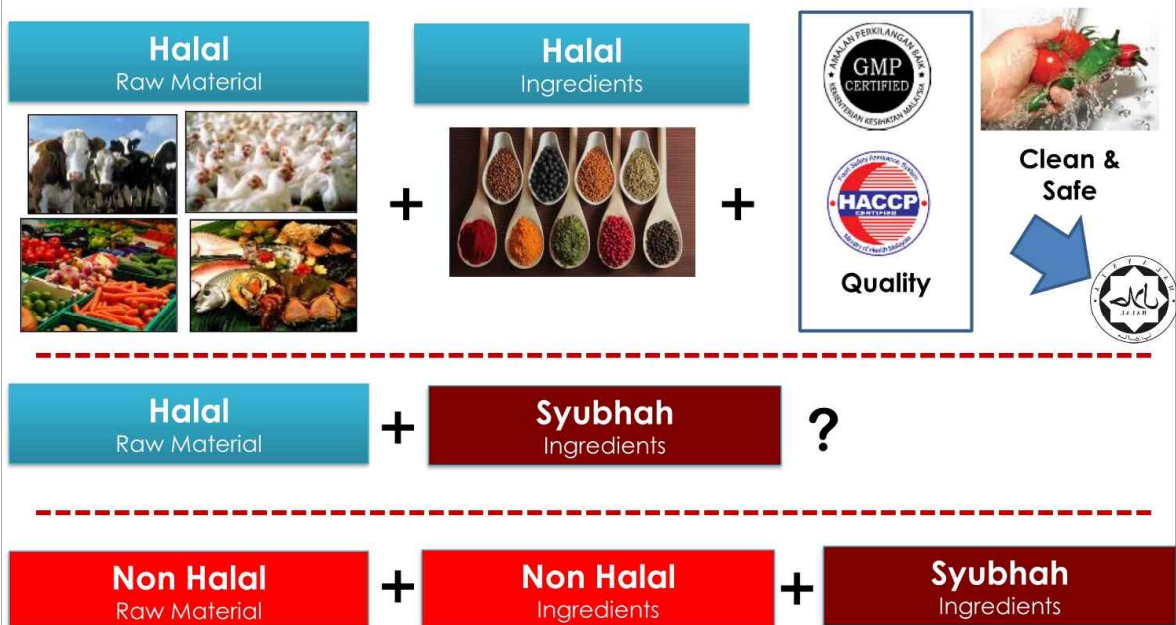
HDC



11

Certification comes in to clear doubt

HDC



12



حلال

HALAL

- Adhering to standards of hygiene and cleanliness
- Ensuring safe and clean on products handling procedures
- Ensuring Halal status of raw materials

Certification Schemes under Department of Islamic Development



Consumer Perspectives

HDC



Consumer Acceptance

Halal for All



Global Halal Marks

Trust

Popularity



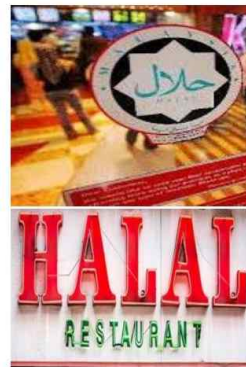
Visibility



Consumer Choice



Certified vs. Non-Certified



Food Establishment/
Premise

Perception



15

Muslim Travel / Islamic Tourism

HDC



Travel Industry

Services – in-flight catering



Infra

Basic Amenities
@ Airport, Malls,
Hotels

Muslim Friendly

Eating Places



Understanding
the Principles

Tour Guide

For Muslim
Package Tour



16

Influence of Korea in Malaysia

HDC



Certification Body in Korea Recognised by JAKIM

HDC

SOUTH KOREA

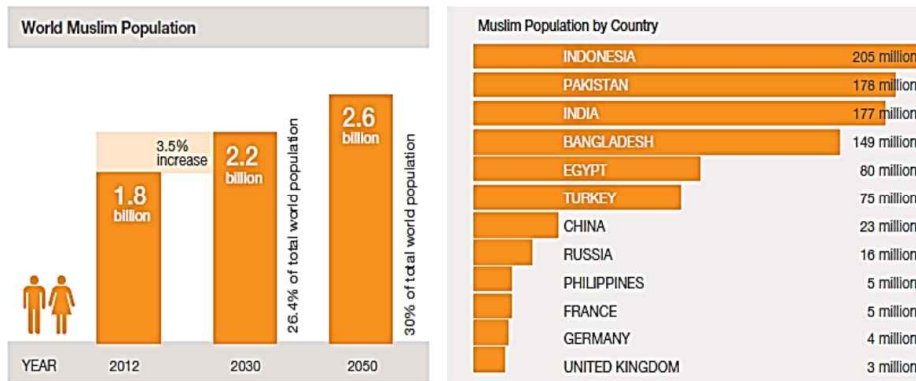
No.	Organization & Address	Contact	Halal Logo
64	Korean Muslim Federation (KMF) 39 Usadan-ro 10gil Yongsan-gu Seoul 04405 Korea	Dr. Hussein Kim Dong Eok (President) Mr. Ahmad Cho Min Haeng (Chairman) Tel : +82-2 793 6908 / +82-2 794 7307 Fax : +82-2 798 9782 Email: kmfhalal@naver.com	

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• Why Halal Industry?

HDC

The Global Halal Market Potentials



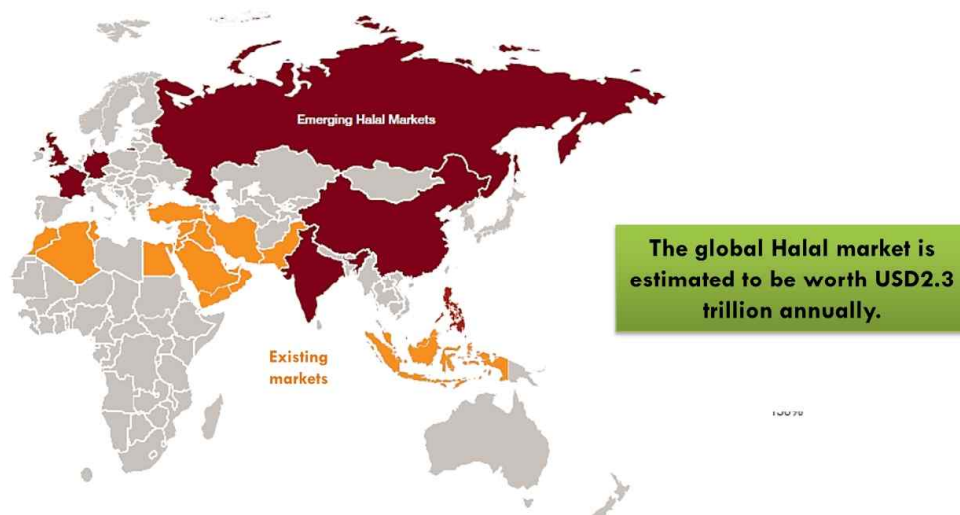
Source: Fleishman-Hillard Majlis, "The next billion: The market opportunity of the Muslim world" (July 2012)

The Halal industry will increase in tandem with the growth of Muslim population

19

The Global Market for Halal Economy

HDC



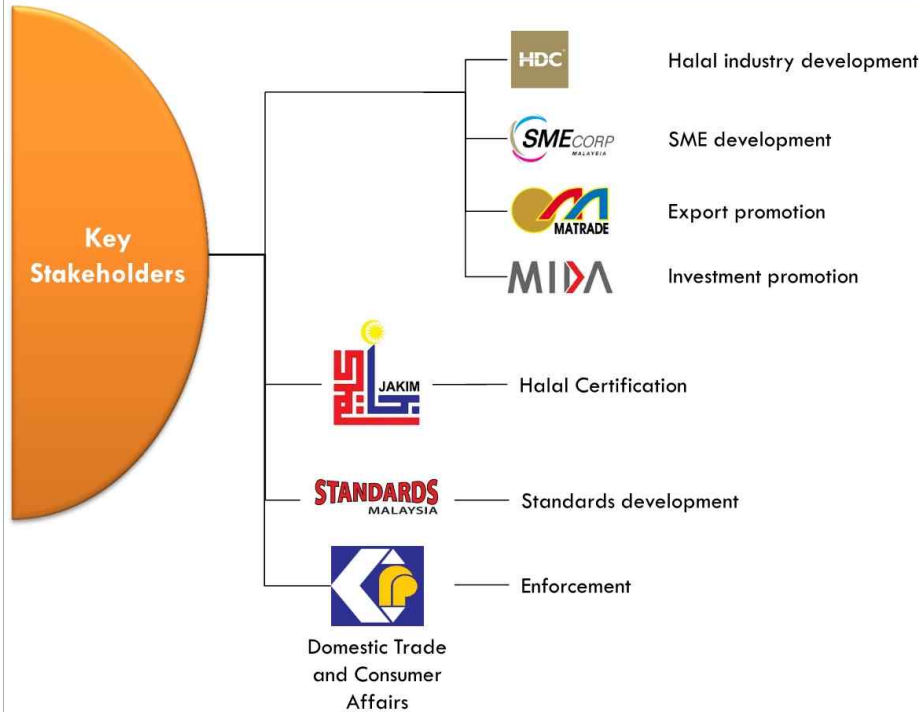
Note: Figures stated only represent key segments (e.g. food) according to current conventions. The overall market potential will be much larger if we include other sectors that have yet to be quantified.

Source: Fleishman-Hillard Majlis, "The next billion: The market opportunity of the Muslim world" (July 2012) and PwC, "Islamic finance, Creating value" (June 2013)

20

Key stakeholders in Halal Malaysia development

HDC



21

Available Standards related to 'Halal' has increased over the years, shaping the nation's Halal landscape

Responsible for the development of Halal Standards and to coordinate and manage related standards



Standards ranked by rate of usage:

1. MS1500
2. MS1900
3. MS2200

NO	MS NO.	TITLE
1	MS 1500:2009 (E)	Halal Food - Production, Preparation, Handling And Storage - General Guidelines (Second Revision)
2	MS 1900:2005	Quality Management Systems - Requirements From Islamic Perspectives
3	MS 1900:2014	Shariah-based Quality Management Systems - Requirements With Guidance (First Revision)
4	MS 2200-1:2008	Islamic Consumer Goods - Part 1: Cosmetic And Personal Care - General Guidelines
5	MS 2200-2:2013	Islamic Consumer Goods - Part 2: Usage Of Animal Bone, Skin And Hair - General Guidelines
6	MS 2300:2009	Value-based Management Systems - Requirements From An Islamic Perspective
7	MS 2393:2013	Islamic And Halal Principles - Definitions And Interpretations On Terminology
8	MS 2400-1:2010	Halalan-toyyiban Assurance Pipeline - Part 1: Management System Requirements For Transportation Of Goods And/Or Cargo Chain Services
9	MS 2400-3:2010	Halalan-toyyiban Assurance Pipeline - Part 3: Management System Requirements For Retailing
10	MS 2400-2:2010	Halalan-toyyiban Assurance Pipeline - Part 2: Management System Requirements For Warehousing And Related Activities
11	MS 2424:2012	Halal Pharmaceuticals - General Guidelines
12	MS 2565:2014	Halal Packaging – General Guidelines
13	MS 2594:2015	Halal Chemicals For Use In Potable Water Treatment - General Guidelines
14	MS 2610:2015	Muslim Friendly Hospitality Services – Requirements

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HDC - HALAL INDUSTRY TRAINING

www.hdcglobal.com



The need for halal talent is magnified as more industry players become involved in halal business, hence, it created the need for qualified people to administer halal matters. In view of this, HDC through Halal Industry Training has foreseen the need to cultivate and sustain flow of training through a long cycle of halal ecosystem.

Training courses @ HDC

HALAL INDUSTRY TRAINING PROGRAMME 2019													
Course Title		MONTH											
		PRICE PAX (RM)	QUARTER 1			QUARTER 2			QUARTER 3			QUARTER 4	
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	Halal Industry - The Fundamentals (HIF) 1 Day	550		07	05	03	02	11	02	06	03	01	05
2	Best Practices for Halal Industry - Food & Food Services (BHP) 2 Days	1,100	15-16	12-13	12-13	09-10	07-08	18-19	09-10	14-15	11-12	08-09	12-13
3	Halal Assurance Management System (HAS) 2 Days	1,150	23-24	19-20	19-20	16-17		25-26	16-17	20-21	18-19	15-16	19-20
4	Halal Internal Auditing (HIA) 3 Days	1,650		25-27	26-28	23-25			23-25	27-29	24-26	22-24	26-28
5	Professional Certification in Halal Executive Program (HEP) 10 Days	3,800			04-08 11-15			13-15 20-22 26-29			17-21 23-27		05-07 12-14 18-21
6	Hazard Analysis and Critical Control Point (HACCP) 2 Days	1,100		12-13		09-10				06-07			05-06



HDC TRAINING CENTER
3.10 Level 3, KPMG Tower, First Avenue, Persiaran Bandar Utama,
Bandar Utama, 47800 Petaling Jaya, Selangor D.ENG. MALAYSIA
Tel: +603.7965.5555 Fax: +603.7965.5555
Website: www.hdcglobal.com

Note: HDC reserves the right to cancel or reschedule any training, or to change trainers. 100% HRDF Claimable SKL Scheme.

HDC also provides In-House Training locally and internationally. For more information, please call +603-7965 5555 or email to training@hdcglobal.com

Branding of Halal Malaysia to the World

Fostering A True Halal Economy: Global Integration and Ethical Practice

Organised by:



WORLD HALAL CONFERENCE 2019

3 & 4 April 2019

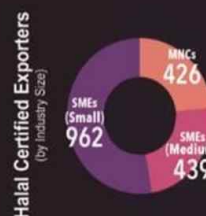
Malaysia International Trade and Exhibition Centre (MITEC)

KUALA LUMPUR



MALAYSIA HALAL EXPORT 2018

Generated by Halal Datawarehouse System



Note: Excluding palm oil (crude and primary processed products)
* Source: Department of Statistics (DOSM), Customs Department (Customs), Perindustrian, and Halal Datawarehouse (HDC)
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Note: 8 - privatisation

Halal Export Value (by Group of Countries, MYR)

Asia Pacific Economic Cooperation (APEC)	26.2 Bil
Trans-Pacific Economic Partnership (TPP)	13.6 Bil
Association of Southeast Asian Nations (ASEAN)	11.9 Bil
Organisation of Islamic Cooperation (OIC)	11.3 Bil
Group of Eight (G8)	8.7 Bil
Group of Fifteen (G15)	6.5 Bil
Commonwealth	5.5 Bil
European Union (EU)	3.3 Bil
Middle East & North Africa (MENA)	3.3 Bil
Gulf Cooperation Council (GCC)	2.1 Bil

Total Halal Malaysia Export Value 2018 (MYR)

40.0 Bil (p)

Total Malaysia Export Value 2018 (MYR)

998.0 Bil (p)

Halal Export Contribution 2018

4.0 %

Halal Export (by Bumi Status, MYR)

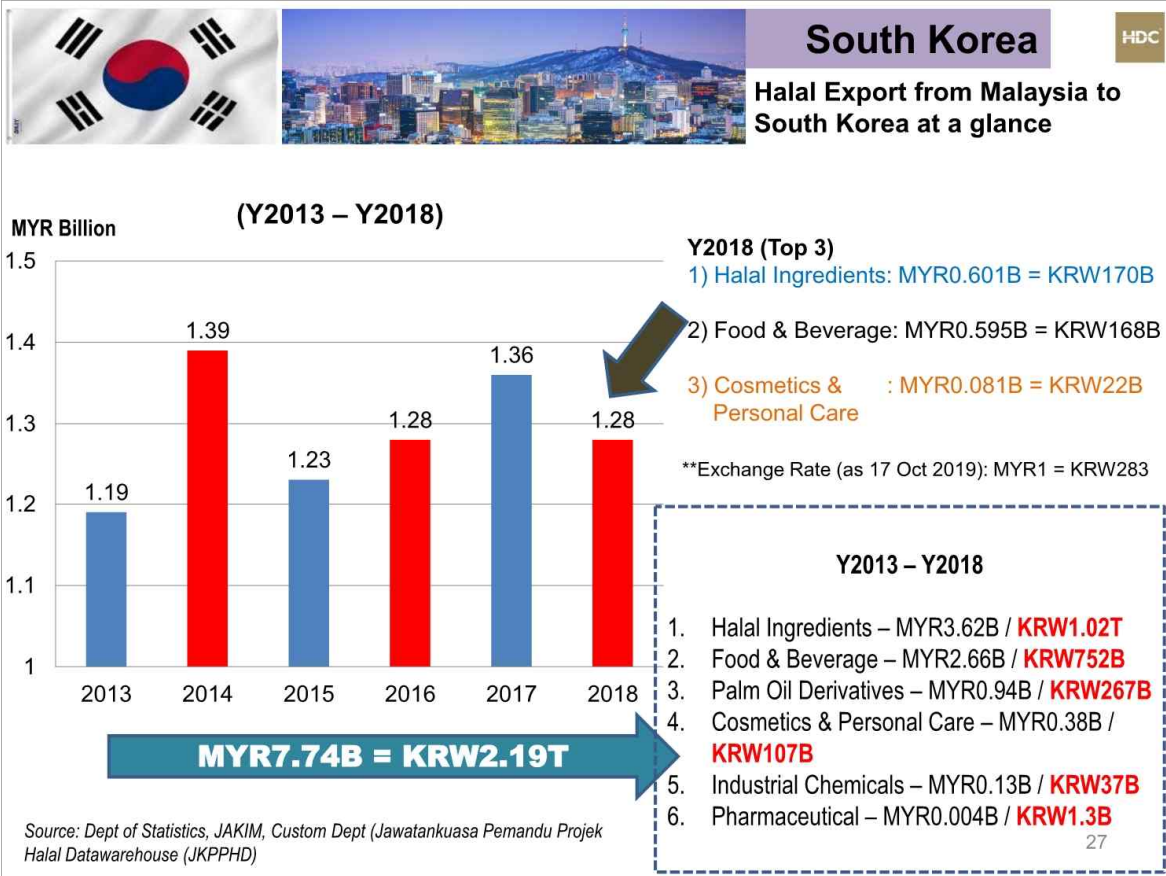
BUMI	NON BUMI
2018: 3,246.06 Mil	2018: 36,661.14 Mil
2017: 3,650.31 Mil	2017: 39,573.20 Mil
Unspecified (2018): 129.78 Mil	Unspecified (2017): 115.44 Mil
	12.4%

Halal Export Value (2014 - 2018, MYR)



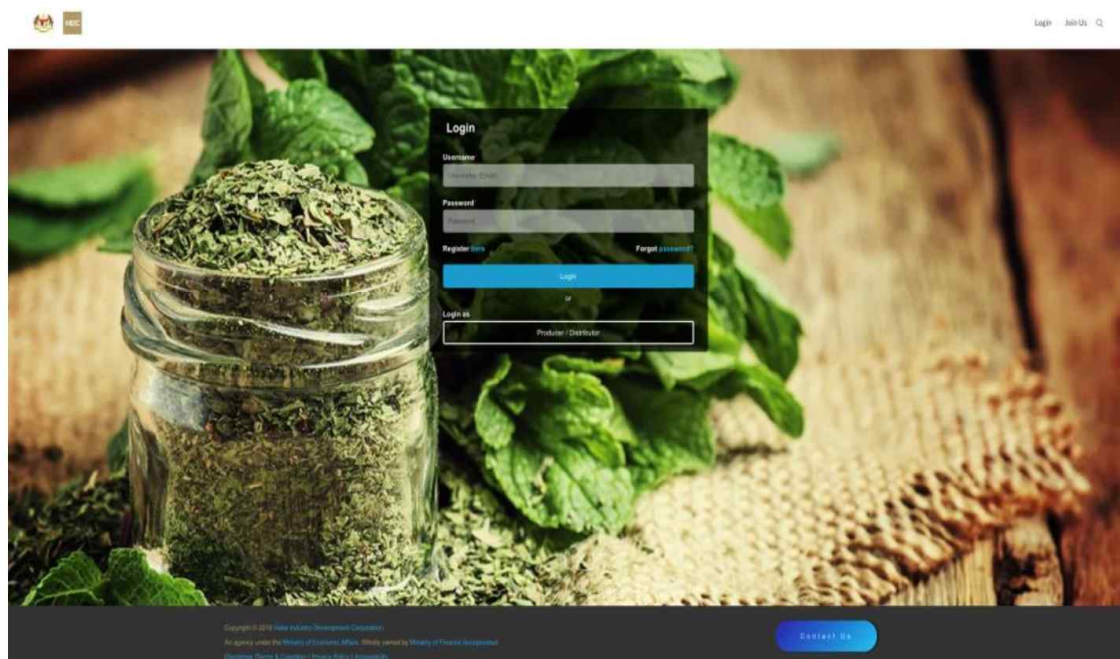
Halal Export Value (by Product Cluster, MYR)

Food & Beverage	20.0 Bil	Pharmaceutical	1.8 Bil
Halal Agriculture	14.5 Bil	Pharmaceutical	0.4 Bil
Consumer & Personal Care	3.0 Bil	Pharmaceutical	0.4 Bil
Grand Total: 40.0 Bil			



Repository - Halal Ingredients Directory Portal (HIDP)

halalingredients.hdcglobal.com



28

Halal Apps



The way in which consumers purchase goods & services is constantly changing with economic and technological developments on a global scale. As consumers have more ways to interact with brands, businesses need to be able to engage anytime and anywhere.

Source: 2019 Megatrends: Euromonitor international

Emerging in technology change the business marketing strategy to meet the change of consumer spending and lifestyle. 5G, AI and social media as business platform is the trend.

Consumer
Choice



29

Reach Us via Social Media



@HDCMalaysia



@HDCMalaysia



hdc.malaysia



Linkedin.com/in/hdcmalaysia



Nomophobia

Developing an irrational fear of being without a phone

FOMO

(Fear Of Missing Out)

The feeling of having to keep up with what people are doing in social media posts

Conclusion

HDC

- 1.8 billion Muslim population. Supply for Halal food and non-food products is not enough to cater the demand.
- Challenge is to develop a more robust and efficient global supply chain benefitting Muslim world
- Hence, opportunities are enormous.



Hotline 1800-880-555

Visit us at: www.ghsc.com.my

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Q&A



Halal Industry
Development Corporation

Halal Industry Development Corporation (HDC)

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+603 7965 5400 (outside Malaysia)

Thank you


www.hdcglobal.com

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About Us

In 2005, the National Biotechnology Policy (NBP) was launched with the aim to make biotechnology as a new economic engine for the country. Among the many initiatives taken was to upgrade the three biotechnology cooperative centers (BCC) set up in 2002 into national biotechnology institutes in 2006. The BCCs were then named as Malaysia Institute of Pharmaceuticals & Nutraceuticals (IPHARM), Agro-biotechnology Institute Malaysia (ABI), and Malaysia Genomic Institute (MGI).



VISION

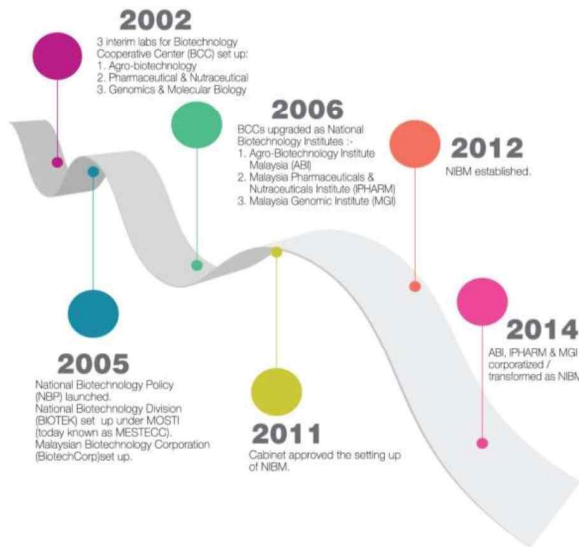
Leading Biotechnology and Bioscience RDI&C for Malaysia economic growth and environmental sustainability.



MISSION

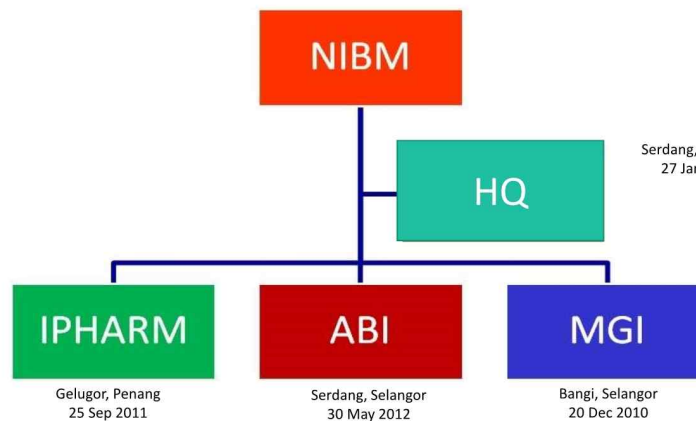
National centre for commercialization driven R&D in healthcare, agriculture and Industrial biotechnology

Establishment of NIBM



- National Institutes of Biotechnology Malaysia (NIBM) is a consortium of three national biotechnology institutes – Malaysian Institute of Pharmaceuticals & Nutraceuticals (IPHARM), Agro-biotechnology Institute Malaysia (ABI), and Malaysia Genomic Institute (MGI).
- NIBM was established on 27 January 2012 as a Company Limited by Guarantee (CLG), an autonomous not-for-profit entity to administer IPHARM, ABI and MGI. While the institutes focus on R&D, NIBM will set priorities and direction for R&D activities, derive plan for commercialization of R&D outputs and establish networking and collaborations.
- IPHARM, ABI and MGI which were set up in 2006 as government agencies supervised by MOSTI, were officially transformed into NIBM on 1 March 2014.

NIBM Organization Chart



Serdang, Selangor
27 Jan 2012



NIBM – National Institutes of Biotechnology Malaysia
ABI – Agrobiotechnology Institute Malaysia
MGI – Malaysia Genome Institute

IPHARM – Malaysian Institute of Pharmaceuticals & Nutraceuticals
CMO – Corporate Management Office

NIBM Focus Area



Discovery & development of crop, livestock & food for better quality & higher yield



Discovery & development of genes, enzymes & plant cells for industrial applications & bioinformatics



Drug discovery from natural tropical sources for healthcare, pharmaceuticals & nutraceuticals



Contribution in Biotechnology

RD&I

Flagship, Science Fund, Techno fund, MSI, FRGS, Dana Khas, DSTIN etc.)

Intellectual Property

(Patent, Trademark, Industrial Design etc.)

Journal / Publication

Product Development

Impact to Biotechnology Sector & STI



Impact to Social / Community



Impact to Industry Player & Product Development

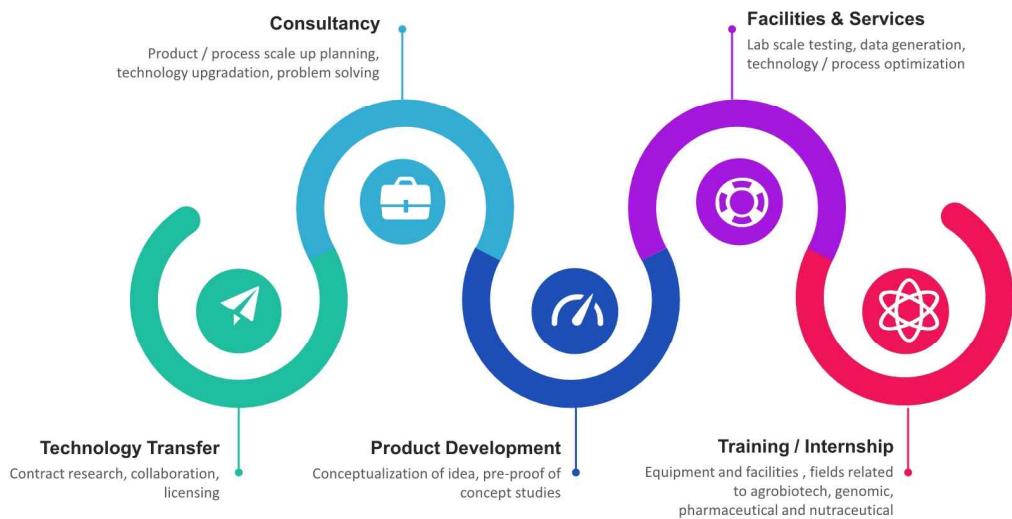


164

75

871

27





Products

Products, Services, Trainings & Consultation



FIZZY ANNONA

Soursop Extract With Mas Cotek Herbs

Soursop Extract With Kacip Fatimah Herbs

FIZZY ANNONA contains refreshing soursop (*Annona muricata*) fruit extract as the main ingredient. Soursop fruit is high in vitamin C, fibre, Phosphorus, Calcium and Fructose. "Mas Cotek" (*ficus deltoidea*) is another medicinal local herbs that can be consumed by both men and women who want to remain active and healthy. Another variant is enhanced by infusing soursop with local traditional herb "Kacip Fatimah" (*Labisa pumila*) in the effervescent granules cater specially for women.



RHINOBOOSTER : Tiger Milk Mushroom

Rhinobooster is a product containing extract of tuber from our in house cultivated tiger's milk mushroom. Each bottle of Rhinobooster healthy drink contains 50 mg of freeze dried polysaccharide-rich extract to boost body immune system and also as an antioxidant agent.



Agarwood Inoculum

Production of inoculum formulation as inducer for formation of agarwood in *Aquilaria* trees. This formulation can be injected into the *Aquilaria* trees from the age of 2 years and above. This inoculum may plays the roles of interaction with the trees and spread to form resin.



Nutritional Supplements for Animal and Aquaculture Feed

Trace minerals, minerals, amino acids and vitamins help animal and aquaculture species improve performance in a variety of important ways including optimal growth, immunity and reproduction



Corn Silage Fermentation System

By adding microbial inoculants into the silage, it will increase the bacterial population which then dominate the fermentation improving quality of the silage. The use of bacteria has proven to improve the preservation proses, speed up the fermentation duration and conserved nutrition value of corn silage thus produced a good quality silage as ruminant feed.



Products

Products, Services, Trainings & Consultation



Halal Formulated for Fish Feed Pellet

Feed pellet formulation is essentially applied nutrition. Precise understanding of these terms is essential to their correct nutrient requirements.



LiPro®5000 Workstation

LiPro®5000 Workstation is a versatile liquid propagation system / low cost bioreactor system for growing various types of organs and tissues such as mycelium and young seedlings.



High Value Mushroom

Cultivation of high value mushroom such as Tiger Milk Mushroom, Shiitake and Lingzhi for food, industry and medicinal applications.



Plant Seedlings From Plant Tissue Culture

Mass propagation and supply of selected tissue culture plantlets to cater plantation industries. Among the plants that have been successful grown are *Zingiber officinale* (Ginger), *Kaempferia parviflora* (Black turmeric / Kunyit Hitam) and *Fragaria* spp (Strawberry)



Products, Services, Trainings & Consultation

Services

ANIMAL BIOTECHNOLOGY RESEARCH CENTRE

- 1 Conducting research in the field of animal biotechnology in term of nutrition and production, breeding and reproduction, aquaculture production and health and animal health like vaccine & diagnostics.
- 2 Formulating and implementing research projects for the programme to secure grants.
- 3 Carrying out technology foresight studies to identify the appropriate and latest technologies for the research programme
- 4 Periodic monitoring and improving at the laboratory level the implementation of the projects

FOOD BIOTECHNOLOGY RESEARCH CENTRE

- 1 Conducting research in the field of food biotechnology like Bio-ingredient, process improvement, functional food and food safety & security such as improving research technique in food processing, development new product on bio health, finding new crop as source of food, using microbe in food industry and secondary metabolite production as a food additive or probiotics through microbial culture.
- 2 Formulating and implementing research projects for the programme to secure grants.

PLANT BIOTECHNOLOGY RESEARCH CENTRE

- 1 Conducting research in the field of plant biotechnology like plant genomics, bio fertiliser & bio control, Genetic Engineering, bio pharming, bioreactors for process development and Conversion of biomass into energy, byproducts, Algae Biotechnology, Plant Tissue Culture & Biofactory and Mushroom Biotechnology
- 2 Formulating and implementing research projects for the programme to secure grants,
- 3 Carrying out technology foresight studies to identify the appropriate and latest technologies for the research programme,



Products, Services, Trainings & Consultation

Training & Consultation

- Production of Red Claw Cray Fish *Cherax Quadricarinatus*.
- Production of Iridescent Shark (ikan Patin) *Pangasiodon sp.* in FRP Tanks/ Production of Red Tilapia *Oreochromis niloticus*.
- Production of Kelah Fish.
- Plant Seedlings (Ginger, Kunyit Hitam, Strawberry).
- Production of tiger's milk mushroom for its tuber, inoculated mushroom bag and food products.
- Production of Ulam Raja Plant-based Ice Cream/ Cosmos Plant-based Ice Cream.
- Plant Tissue Culture Training.



Products, Services, Trainings & Consultation



RapidRAW™

RapidRAW™ is a newly develop kit to determine pure and artificial honey. This kit are able to produce result in less then 5 minutes & 99% accuracy.



LabSensor

LabSensor is a remote smart monitoring system that run 24/7. LabSensor are able to monitor temperature from -200°C to 1000°C. LabSensor are able to monitor various type of machine as long as it has digital panel display. LabSensor can alert user via message and fake call is the monitored machine had any problem.



DnaKU

dnaKU is a product that will unlock your DNA code and provide to you an inessential information that will guide you with your diet, nutrition, exercise and day to day activities. Your genetic code will be analyze to genome wide association study that are consisting 70,000 of genetic marker. All of the genetics marker consisting of diseases, physical traits and unique traits.



GeoDB: Geobacillus mahadia Geo-05 Database

Bacteria isolated a microorganism from a hot spring in Malaysia at a temperature of about 102°C. Complete 16S rRNA sequence profiling has identified the organism as Geobacillus sp. To date, there are only 7 hyperthermophilic genome sequences in the public databases and none of them are indigenous to Malaysia.

Products, Services, Trainings & Consultation



Genomics Facilities

The Genomics Facility in MGI has been established as a national core facility to serve research needs. We promote advancements in biology by providing researchers complete genomic solutions using state-of-the-art DNA and RNA analysis instruments. The instruments available range from traditional capillary sequencing (Sanger Technology), low-throughput next-generation sequencing (IlluminaMiSeq® System) to high-throughput NGS sequencing (Illumina HiSeq 2000). The facility is perfectly suited to cater your project needs whether whole genome sequencing (WGS), transcriptome sequencing, amplicon-based projects, metagenomics as well as targeted sequencing.



Protein Engineering & Bioprocess

The Protein Expression and Purification (PEP) facility offers access and services to research requiring instrumentation and expertise on expression and purification of recombinant or wild type prokaryotic and eukaryotic proteins. Furthermore, we offer as a services from 1 milligrams to 1 grams per liter production of proteins using bioreactors and purification of tagged and non-tagged proteins using various chromatographic techniques such as Affinity, Ion-exchange and Size Exclusion Chromatography.



Proteomics and Metabolomics Facility

The proteomics and metabolomics facility provides an infrastructure for the identification and characterization of proteins and metabolites. Proteomics services include a protein identification and protein quantification (label-free, TNT and iTRAQ) from a wide variety of sample types. Metabolomics services include a detection and quantification of small molecules metabolite and compounds. The facility is equipped with a wide range of mass spectrometry instrumentation, liquid chromatography platform, sample preparation technologies and data analysis software.



Genomic Computing Centre (GCC)

The Genomic Computing Centre (GCC) provide computing support for bioinformatics analysis for both genome and transcriptome sequence analysis, proteomics or integration. GCC also hist the National Biotechnology and Bioinformatics Network (NBBnet), which is a network of resources and infrastructure, aimed at providing bioinformatics and biotechnology information capability and capacity to the Malaysia biological research community. Generally GCC is a facility that provides computing support for bioinformatics for all omics analysis such as Genome Assembly, Transcriptome analysis, Genome Annotation, Phylogenetics, SNP Calling and Miscellaneous sequence analysis.

Products, Services, Trainings & Consultation



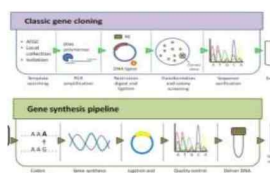
Genomic Bank

The Genomic Biobank repository designed to collect, process, store and track biospecimens swiftly and efficiently. Genomic biobank preserve biospecimens (for research and industrial purposes) and provide support to ensure the quality and safety of biospecimens. Genomic Biobank is a dedicated aircondition room with Ultra Freezers (-80°C) and Frozen Freezers (-20°C). Samples are optimally stored in a secure room with 24 hours and 7 days monitoring. Biospecimen information are stored using a centralized data management system developed by the institute, which was Genome BioBank Management System (GBMS).



Structural Biology & Biophysics

Structural Biology & Biophysics Facility offers services and training for instruments and technologies in structural biology, molecular interactions and biophysical characterization. Bruker Ascend 700 MHz Nuclear Magnetic Resonance (NMR) provide wide information for structural dynamic and interaction of biomolecules. X-ray Facility is equipped with laboratory X-ray source MicroMax™007 HF and Gryphon automated liquid handling system that will help to determine protein structure. Biophysical Facility include Nano ITC and Biacore X 100 for label free macromolecular interaction.



Synthetic & Molecular Biology

In order to save time and cost, molecular biologist around the world had developed a few method and techniques as aid in daily job. Some of the method is Site directed mutagenesis, DNA cloning and Genome modification. By manipulating all of these method we are able to customize or synthesize our own bio material that are beneficial to us perfectly and cost effectively.

Products, Services, Trainings & Consultation

● Basic NGS Data Analysis Workshop.

● Bioinformatics in Vaccine and Drug Design.

● Bioinformatics Workshop: Analysis of NGS Data.

● Microbial Metagenomics Workshop.

● Basic NGS Data Analysis Workshop.

● Introduction to Bioinformatics and LINUX Workshop.

● NGS Data Analysis Workshop.



Products, Services, Trainings & Consultation

Products



Insect Repellent
Specially formulated to repel mosquitoes



Hand Sanitizer
Instant antimicrobial disinfectant with perfumed moisturizer.



ZANTHOpalm Nutrition Drink
ZANTHOpalm is a new innovative nutrition drink containing Standardized Curcuma xanthorrhiza blending with our in-house 100% natural recipe. The soluble granule has synergistic effect for sustaining good health. It's a granule form is to be dissolved in water and use as daily refreshment.



Caricalyte ORS
Caricalyte ORS is a new oral rehydration salts formula containing a balanced combination of Carica papaya standardized leaf extract, glucose, salts and electrolytes. The soluble granule replenishes water and salts and thereby helps maintain a proper fluid balance. When dissolved in water, the green granule forms a chartreuse colour solution.



HydraFAST Effervescent Tablet
HydraFAST Effervescent Tablet is new formula containing a balanced combination of Carica papaya leaf extract, lactose, acid, base and electrolytes. The fast soluble tablet replenishes water and electrolytes lost thereby help maintain a proper body fluid balance. When dissolved in water, the green tablet forms a chartreuse colour solution.



Products, Services, Trainings & Consultation

Products



IPHARMATIX® Spa Kit
IPHARMATIX® Spa Kit is developed to offer choice to the consumers that prefer natural skincare ingredients. This spa kit is prepared using natural and assured safe ingredients to use. The main component of this kit is the cosmetic base (Hamin), which was produced using 100% palm oil.



Carica Scrub
This gorgeous Carica scrub suitable for both face and body offers an abundance benefits to your skin. Formulated mainly using our unique natural pharmaceutical and cosmetics base made from palm oil and kernel oil components and derivatives as well as natural papaya seed oil and granules, this scrub will not only remove surface impurities but also will leave skin feeling nourished and moisturised.



Activate CII Facial Cleanser
Formulated mainly using our unique natural pharmaceutical and cosmetics base made from palm oil and kernel oil components and derivatives as well as activated carbon granules, it gently remove impurities leaving skin feeling moisturised and refreshed. With activated charcoal, this unique cleanser are able to perform deep cleansing by drawing dirt, oil and other harmful substances including makeup from clogged pores.



SPF Quality Rodent
The facility capable in supplying SPF quality rodent, the 5 strains including Sprague Dawley, WKY rat, SHR, Balb/c mice and ICR, and non-rodent New Zealand White rabbits. All these strains are high quality standard and commonly used in preclinical research and the pricing are very competitive as compared to the AAALAC accredited overseas sources.



Services

Products, Services, Trainings & Consultation



Product Development Research Division

Product Development Research Division develop prototype at lab scale for optimization & pilot scale for registration purpose so that research works related to pharmaceuticals & nutraceuticals from IPharm or outside, catering for local universities, government agencies and small/medium industries prior to commercialization. This can be accomplished either by contract manufacturing or distributorship appointment.



C.elegans Culture Facilities

Caenorhabditis elegans is a non-hazardous free-living nematode. It is widely used in research laboratory since it shares many essential biological characteristics that are central problems of human biology. C. elegans undergoes complex process of development in embryogenesis, morphogenesis, growth and development including nerve function, behavior as well as aging. It served as a good model organism in terms of complexity and tractability such as for gene determination.



MyNature50000

The MyNature 50,000 National Repository operates as a repository Malaysian plants extracts, fractions, partitions and natural product/natural chemical, which are characterized to facilitate the discovery and development of therapeutic agents. The repository includes 500 plants extracts samples collected from various parts of Malaysia, natural products (partitions and fractionations of different organic solvent). Under this resource, MyNature 50,000 National Repository aims to assist academic and private sectors to overcome financial and technical barriers and facilitate the discovery of promising therapeutic agents.



Animal Research Facility

IPharm Animal Research Facility (IPARF) is designed and built to meet the international standards of the Organisation for Economic Co-operation and Development Good Laboratory Practice (OECD-GLP) and the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) to carry out preclinical animal studies and Specific Pathogen-Free (SPF) rodent breeding program.



Services

Products, Services, Trainings & Consultation



Bioprocess Platform

Bioprocess Unit is one of the sub-division under Natural Product and Drug Discovery Centre (NPDC) in IPharm. One of the key research carried out in this unit is the production and application of biomaterial-based fermentation. We are offering Bioprocessing Platform that provides infrastructural and technical support to entrepreneurs with ideas that are microbiology, biotechnology, biochemistry and chemically based. It does so by providing an environment that is other wise costly to obtain and maintain, thereby lowering the business risk, both at IPharm and the entrepreneurs.



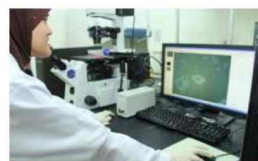
IPharm-NIBM GMP Plant

Potential clients either from local universities or other agencies can come to us with their research works. From this starting point we will work together to develop a pharmaceutical dosage form prototype for registration or notification purpose. The client has the option of becoming the Licensed Product Holder and appoints IPharm-NIBM GMP Plant as their contract manufacturing partner. The plant is designed to manufacture non-sterile products including cosmetics, traditional medicines, health supplements, over the counter (OTC) or non-poison pharmaceuticals & ethical pharmaceuticals (poison/controlled medicines).



Tissue Culture Lab

Our tissue culture laboratory is fully equipped with basic in vitro activity needs and used for various usage including cells or tissue culture works, in vitro testing and etc. The contained-facility is open for all academic researchers (government and private) and also other researchers from companies.



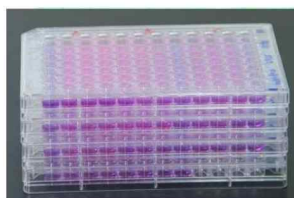
Cell Culture Lab Facility

This facility is equipped with CO2 incubator, type-II biosafety cabinet and inverted phase contrast microscope in a small room equipped with HEPA filter for providing sterile condition.



Services

Products, Services, Trainings & Consultation



Cytotoxicity Testing

The testing is used to determine toxicity level of substances to the cell line by quantification assay such as MTT (3 - (4 , 5 - dimethylthiazol - 2 - yl) - 2 , 5 -diphenyltetrazolium bromide) assay. MTT assay is one of the quantitative evaluations of cytotoxicity where the viability of cells is measured via their metabolic activity. In metabolically active cells, the production of succinate dehydrogenase reduces the yellow water-soluble MTT reagent and forms a blue-violet insoluble formazan product.



Liquid Handling Platform

This platform in IPHARM consists of a liquid handler and a robotic arm where automated aspiration, dispensing and mixing of reagents can be done precisely on 96-well & 384-well microplates. This platform can also replace the normal pipetting routines in laboratories and manufacturing plants, with higher consistency and precision output.



ZebTec Fish System for Zebrafish

Zebrafish (Danio rerio) are rapidly gaining popularity as bio-medical research subjects because of the ability to generate high resolution, in vivo images of the embryos. Zebrafish are easy to maintain and produce a large number of offsprings. Additionally, the embryos have a nearly transparent skin, making their development easily visible. These fish are used for a variety of disciplines, including neuroscience genetics and aging studies.



Training & Consultation

Products, Services, Trainings & Consultation

- Workshop: HPLC and HPTLC Analysis of Phenolic and Flavonoid Compounds in Plant Extracts.
- Workshop: Kursus Pembangunan Perniagaan Berasaskan Kosmetik & Ubatan Tradisional (K2PK).
- Workshop: Real-Time RT PCR and Western Blot Technology for RNA & Protein Analysis.

About HDB

The Housing & Development Board (HDB) is Singapore's public housing authority and a statutory board under the Ministry of National Development. Besides planning and developing Singapore's housing estates, we build homes and transform towns to create a comfortable living environment for all. HDB provides various commercial, recreational, and social amenities in our towns for our residents' convenience.

HDB has earned much international acclaim, including garnering the 2010 United Nations Habitat Scroll of Honour Award, one of the most prestigious global human settlements awards.

History

Established on 1 February 1960 to solve Singapore's housing crisis, HDB was tasked with providing sanitary living conditions to replace the prevalent unhygienic slums and crowded squatter settlements. We built and delivered 21,000 flats in less than three years. By 1965, 54,000 flats were built and the housing crisis was resolved within a decade of our formation.

Public Housing — A Singapore Icon

Singapore's public housing has housed an entire nation — today, more than 1 million flats have been completed in 23 towns and three estates across the island. HDB flats are homes to over 80 percent of Singapore's resident population. Of these, about nine in 10 are proud owners of the flats they live in.

HDB will continue to deliver a quality living environment to meet the evolving lifestyle aspirations of our residents. Towards this end, HDB has embarked on a *Roadmap to Better Living in HDB Towns*. The roadmap outlines our key priorities of achieving well-designed, sustainable, and community-centric towns. We will continue to build new-generation and smart housing, and create the best conducive living environment where communities thrive.

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Note:
The information is updated as of March 2017.

VISION

An outstanding organisation with people committed to fulfilling aspirations for homes and communities all are proud of.

MISSION

- We provide affordable homes of quality and value
- We create vibrant and sustainable towns
- We promote the building of active and cohesive communities
- We inspire and enable each other to give of our best

SUPPORTING PILLARS

For HDB to achieve its mission, a sound public housing strategy is needed. This strategy is defined by three crucial fundamentals:

1. The concept of a sole agency

A sole agency in charge of public housing enables more effective resource planning and allocation. This concept enables us to secure the land, raw materials, and manpower for large-scale construction to optimise results and achieve economies of scale.

2. A total approach to housing

By adopting a total approach covering planning and design, land assembly, and construction, the housing task is carried out as a seamless whole – through efficient allocation, wise management, and ongoing maintenance.

3. Strong government support

Support from the government in the form of political and financial commitment, within a compatible legislative framework has helped to smoothen the journey of housing the nation.



1. LAND AREA AND POPULATION



Land Area (2017)*

719.9 sq km



Average Resident Household Size (2017)**

3.3 persons



Resident Population (2017)*

4.0 million

Chinese: 74.3% | Malay: 13.4% | Indian: 9.0% | Others: 3.2%



Per Capita Gross National Income (2017)***

\$76,863



Resident Population Growth Rate (2017)*

0.8%



Average Monthly Nominal Earnings Per Employee (2017)**

\$5,229



Population Density* Overall density (2017)

7,796 persons per sq km



Resident Population Living in HDB Flats (Mar 2017)****

82% Sold Flats: 79% Rental Flats: 3%

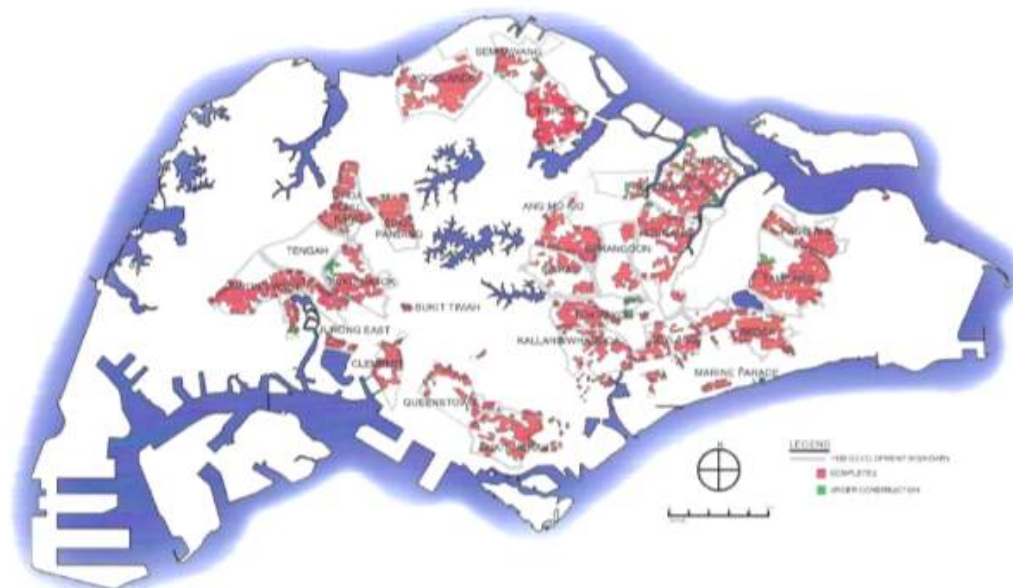
* Singapore Department of Statistics, Singapore in Figures 2018

** Singapore Department of Statistics, Latest Statistics from Singstat Builder (last updated on 2 Jun 2018)

*** Singapore Department of Statistics, Latest Statistics from Singstat Builder (last updated on 24 May 2018)

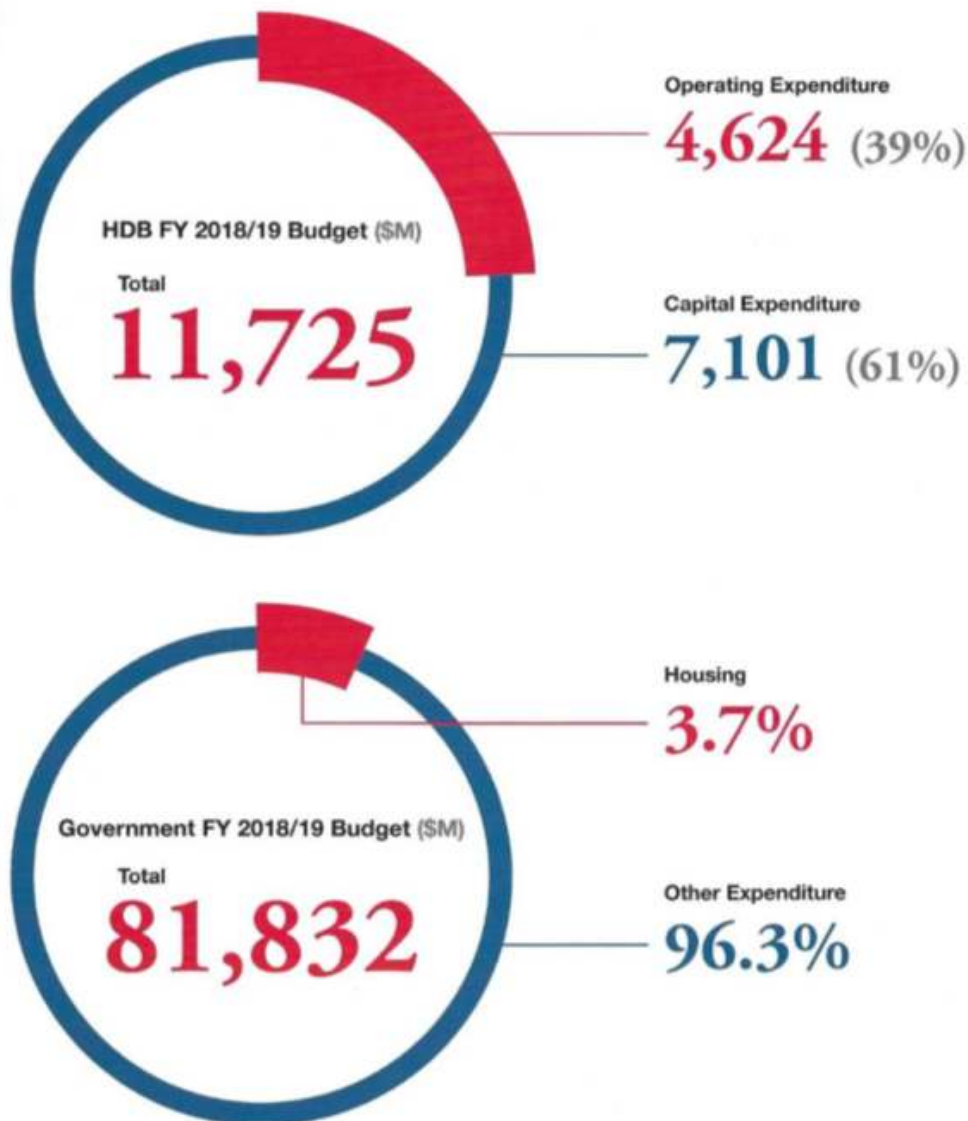
**** HDB Annual Report 2016/2017

LOCATION OF HDB DEVELOPMENTS



2. GOVERNMENT ANNUAL BUDGET

HDB AND GOVERNMENT EXPENDITURE¹



Amount allocated to Housing = 3,038M² (3.7% of total Government Budget)

¹ HDB is a statutory board established under statute. Its expenditure does not form part of government expenditure. The charts are for comparison purpose only.

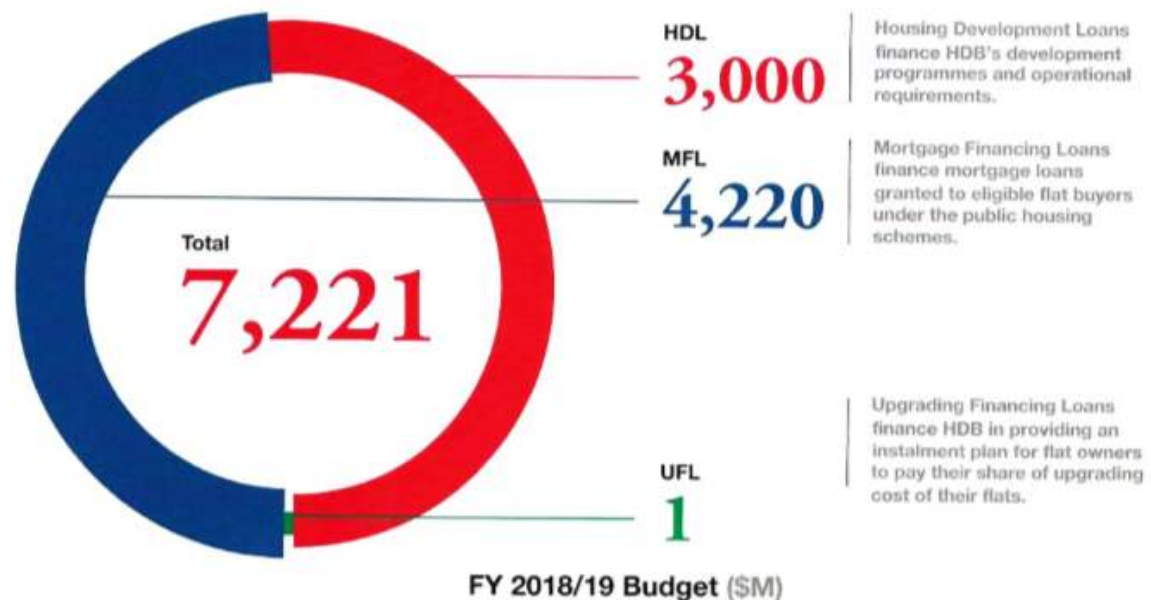
² Government spending on housing includes:

- Grant to HDB to cover its annual deficit and to safeguard the reserves of past governments;
- Expenditure on infrastructure and estates upgrading;
- Grants to Town Councils for estate maintenance; and
- Service & Conservancy Charges rebates to eligible households.

3. FINANCING OF PUBLIC HOUSING

The public housing programme is funded through Government loans and grants.

GOVERNMENT LOANS FOR PUBLIC HOUSING



GOVERNMENT GRANT

The Government provides a housing grant to cover HDB's annual deficit incurred for its operations, which include housing subsidies and subsidies for upgrading of older estates.

BONDS AND BANK LOANS

HDB will, from time to time, issue bonds (or notes) to finance its development programme, working capital requirements, as well as refinance its existing borrowings. Alternatively, it may take out short-term bank loans. Since 15 October 2015, Moody's Investors Service has assigned a Aaa issuer rating to HDB and a (P)Aaa rating to HDB's S\$32 billion Multi-currency Medium Term Notes Programme.

4. FINANCIAL HIGHLIGHTS

INCOME AND EXPENDITURE STATEMENT

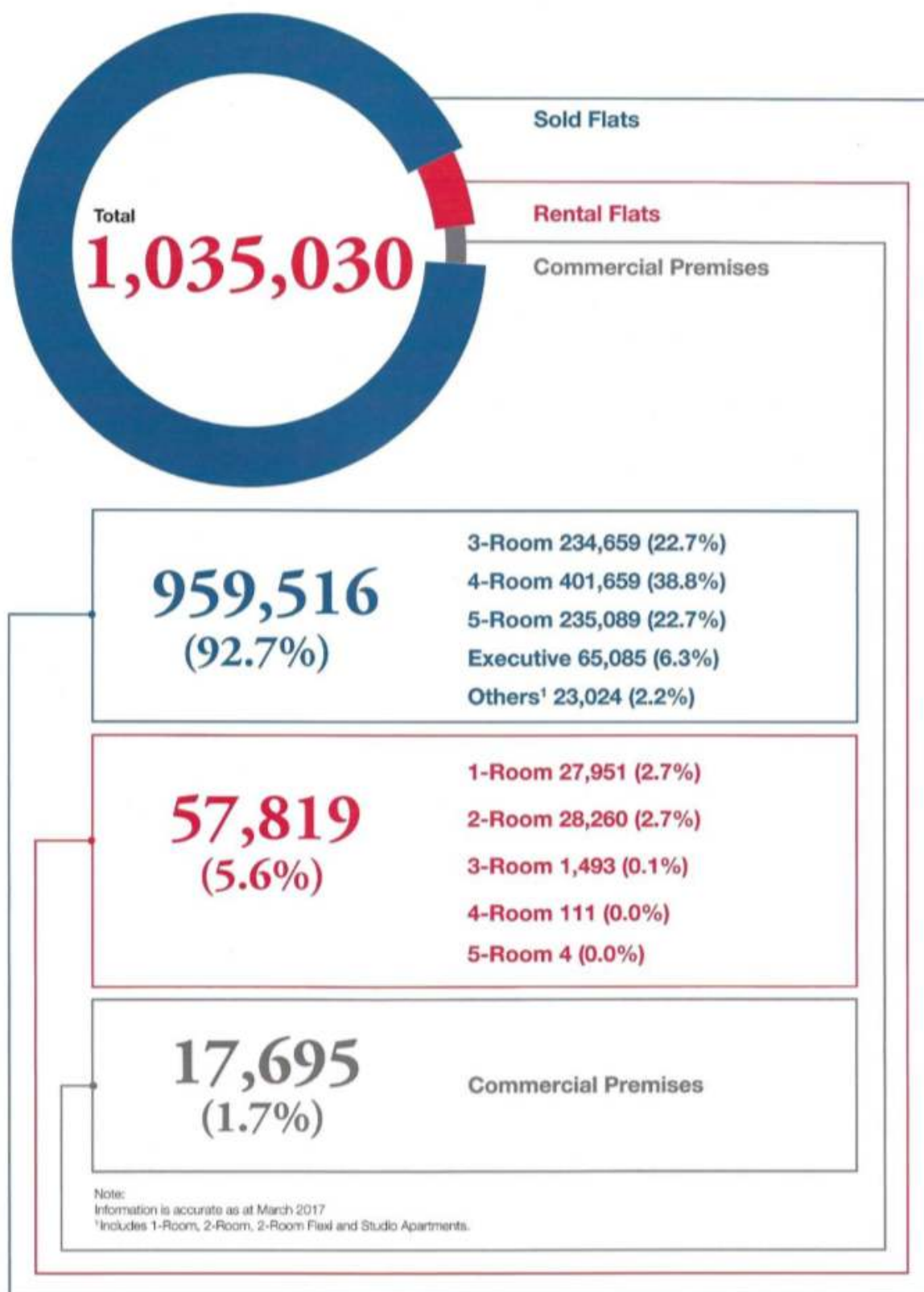
	FY 2017/18 Actual Surplus (Deficit) \$M
Housing	
Home Ownership	(1,383)
Upgrading	(639)
Residential ancillary functions	(338)
Rental flats	(92)
Mortgage financing	(23)
Other Activities	
Other rental and related businesses	753
Agency and others	5
Net Deficit	(1,717)

Note:

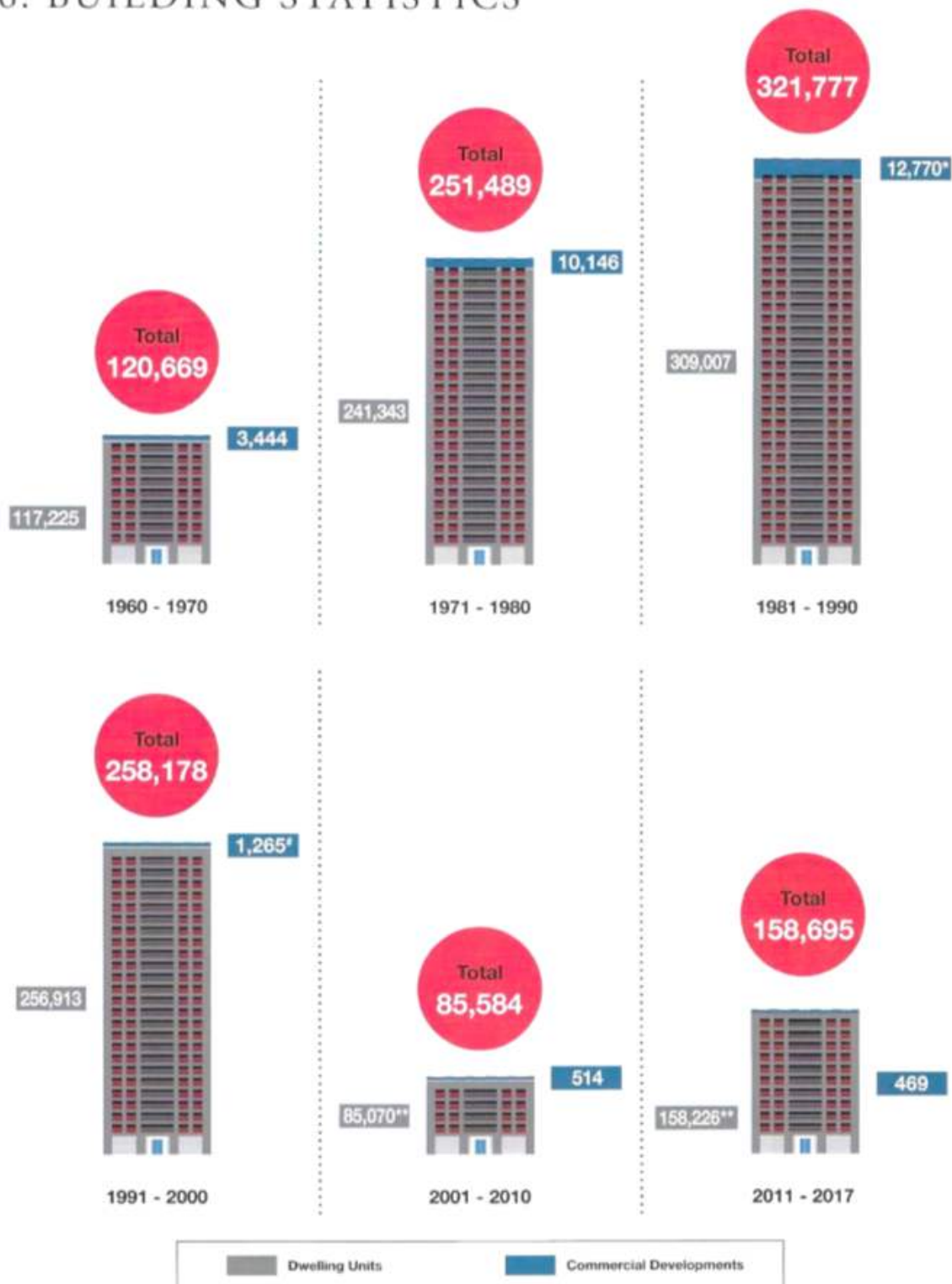
Net deficit is covered by Government grant

The cumulative grant from the Government since inception on 1 February 1960 is \$31,501M

5. PROPERTIES UNDER HDB'S MANAGEMENT



6. BUILDING STATISTICS



Figures are for calendar years

* Includes HUDC units built by the Urban Redevelopment Authority (URA).

** Includes DBSS Flats of 616 units for 2006-2010, and 8,034 units for 2011-2015.

* Before July 1992, commercial developments referred only to eating houses, shops and living quarters, and lock-up shops.

7. LAND USE DISTRIBUTION AND GROSS TOWN DENSITIES FOR TYPICAL TOWNS

HDB towns are comprehensively planned with a full range of facilities to create a self-sufficient environment conducive for residents to live, work, play and learn. Most HDB towns, such as Toa Payoh, are developed based on the Neighbourhood Planning Concept, where the town centre is located at the centre of the town and neighbourhoods located around it. Each neighbourhood is served by a neighbourhood centre that provides essential services within close reach of the residents. Punggol, HDB's youngest town, adopts a new planning concept where smaller residential estates share a common green and a variety of facilities are planned to meet the distinct needs of the residents.

		PUNGGOL TOWN		TOA PAYOH TOWN	
		Ultimate size: 96,000 du ¹		Ultimate size: 45,000 du	
		Land Area (ha)	Percentage	Land Area (ha)	Percentage
1.	Commercial (Town Centre & Commercial Centres)	14	1.6	26	6.0
2.	Residential ^a	382	45.3	188	45.0
3.	Schools ^b	88	10.4	28	7.0
4.	Open Spaces (Parks & Open Spaces)	110	13.0	11	3.0
5.	Sports & Recreation	18	2.1	10	2.0
6.	Institutions ^c	13	1.5	19	4.0
7.	Industries	22	2.6	33	8.0
8.	Major Roads	156	18.5	86	20.0
9.	Utilities & Others ^d	41	5.0	21	5.0
Total		844	100.0	422	100.0
Gross New Town Density		114 du/ha		107 du/ha	

Notes:

¹ du refers to dwelling unit

^a Include private housing within the town boundary

^b Include school fields which are zoned as open spaces

^c Include places of worship and civic & community institutions

^d Include waterway and reserve sites

8. HOME OWNERSHIP SCHEME

In 1964, the government introduced the Home Ownership for the People Scheme to give citizens a tangible asset in the country and a stake in nation-building, and promote rootedness. This thrust towards home ownership also enhanced the country's overall economic, social, and political stability.

In 1968, to encourage more to become home owners, the government allowed the use of Central Provident Fund (CPF) savings for down payment for the flat and to service monthly mortgage loan instalments. This, together with other schemes and grants rolled out over the years, has made home ownership highly affordable and attractive.

ELIGIBILITY CONDITIONS FOR HOME OWNERSHIP

Public housing in Singapore is heavily subsidised by the Government. The following eligibility conditions were introduced to ensure that our limited housing resources and subsidies are allocated to deserving applicants.

FAMILIES

Buying a flat from HDB	Buying a resale flat on the open market	
	WITH CPF Housing Grant	WITHOUT CPF Housing Grant
<ul style="list-style-type: none"> Two Singapore Citizens (SCs) One SC and one Singapore Permanent Resident (SPR) 		<ul style="list-style-type: none"> Two SCs One SC and one SPR Two SPRs
Total monthly household income must not exceed \$12,000		No income ceiling
Applicants must be at least 21 years old and form a family nucleus*		
Applicants must not own any private residential property in the last 30 months prior to flat application		Owners of private residential property must sell their property within six months from effective date of flat purchase
	Applicants must be first-time home buyers	

SINGLES

Buying a 2-Room Flexi Flat from HDB	Buying a resale flat on the open market	
	WITH CPF Housing Grant**	WITHOUT CPF Housing Grant
Applicants must be SC and at least 35 years old		
Total monthly income must not exceed \$6,000		No income ceiling
Applicants must not own any private residential property in the last 30 months prior to flat application		Owners of private residential property must sell their property within six months from effective date of flat purchase
Applicants must be first-time home buyers		

* Comprising married couples with or without child(ren) or divorced/ widowed person with children

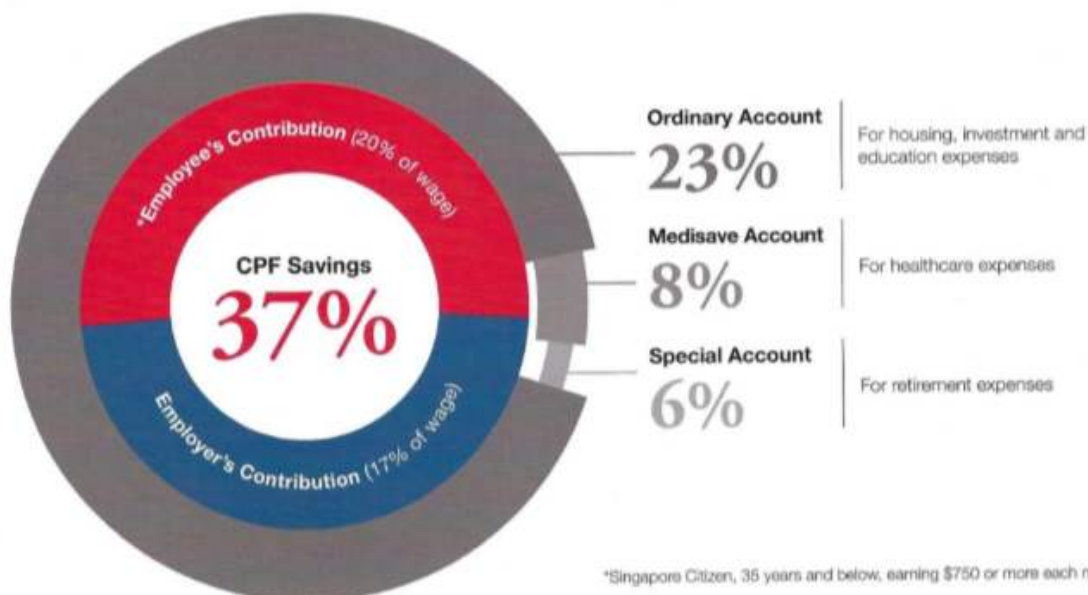
** If buying 2-room to 5-room flat

ELDERLY

Under the 2-Room Flexi Scheme, elderly citizens have the flexibility of choosing the length of lease on their 2-Room Flexi flat, based on their age, needs, and preference. Applicants aged 55 and above can take up a lease of between 15 and 45 years in 5-year increments, as long as it covers them and their spouse up to the age of at least 95 years.

- Applicants (married couple or singles) must be at least 55 years old and comprise at least one SC
- Total monthly household income must not exceed \$12,000
- Owners of private residential property must sell their private property within six months from collection of keys.

HOME FINANCING



The Central Provident Fund (CPF) is a social security savings plan for working Singapore residents. Both employers and employees make monthly contributions to the CPF that can be used for retirement, healthcare and housing.

These contributions go into three accounts — Special Account, Medisave Account and Ordinary Account. Of this, 23% will go into the Ordinary Account, which can be used for housing.

On average, first-time home buyers use less than a quarter of their monthly income to pay for their housing loans. This is well below the international benchmark of 30% to 35% for housing affordability.

SUBSIDIES AND GRANTS

Generous subsidies and grants provided by the Government further ensure that ownership of a HDB flat remains affordable and continues to be within reach of home buyers.

BUYING A NEW FLAT FROM HDB

Eligible home buyers can buy their flats directly from HDB at a subsidised rate. These flats are priced below their market value so that buyers enjoy a generous subsidy.

BUYING A RESALE FLAT

First-time buyers of a resale flat will be given a \$50,000 CPF Housing Grant for a 4-Room or smaller resale flat and \$40,000 CPF Housing Grant for a 5-Room or larger resale flat. Those who plan to live with or near their parents/child can also apply for the Proximity Housing Grant of up to \$30,000.

BUYING AN EXECUTIVE CONDOMINIUM

Households with monthly income of up to \$14,000 can buy an Executive Condominium. First-timers earning up to \$12,000 per month may qualify for the CPF Housing Grant of up to \$30,000.

HOUSING GRANTS

Low and middle-income families are given additional grants of up to \$80,000 to help them buy their first HDB flat:

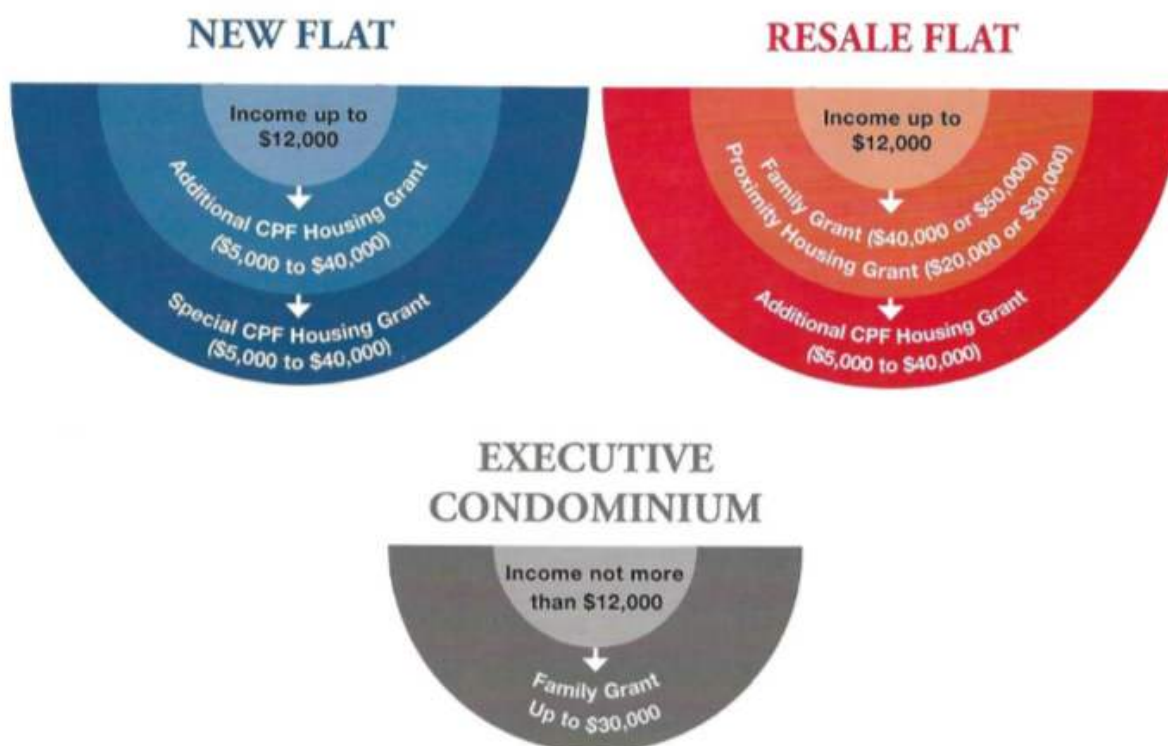
- Households earning not more than \$5,000 per month can enjoy an Additional CPF Housing Grant (AHG) of up to \$40,000, which can be used to offset the price of a new or resale flat.
- Those earning up to \$8,500 per month can also apply for the Special CPF Housing Grant of up to \$40,000 if they buy a new 2/ 3/ 4-Room flat in a non-mature estate.

HOUSING LOANS

HDB also offers up to two housing loans at a concessionary interest rate to eligible flat buyers. Credit assessment is carried out to determine the maximum loan amount based on the applicants' income, age and financial situation. The maximum repayment period is capped at 25 years.



SUBSIDIES AND GRANTS (CONT'D)



HOME FINANCING

Flat Type	2-Room Flexi (99-year lease)	3-Room	4-Room	5-Room
Estimated Floor Area (Sq m)	36/45	65	90	110
Average Indicative Selling Prices*	\$113,000	\$194,000	\$295,000	\$381,000
Median Monthly Income	\$2,000	\$2,600	\$4,600	\$6,500
Additional CPF Housing Grant, if eligible	\$35,000	\$25,000	\$5,000	\$0
Special CPF Housing Grant, if eligible	\$40,000	\$40,000	\$40,000	NA
Nett Selling Price (Less Grants)	\$38,000	\$129,000	\$250,000	\$381,000
Monthly Instalment**	\$122	\$498	\$1,001	\$1,556
Debt Service Ratio	6%	19%	22%	24%

* Average selling prices for new HDB flats under various stages of completion offered in 2017 in non-mature estates.

** Computed based on concessionary interest rate of 2.8 percent over 25 years.

Notes:

- Median monthly income refers to income of first-timer applicants buying a flat direct from HDB in 2017 in non-mature estates.
- Additional and Special CPF Housing Grants are assumed to offset the maximum 90 percent loan where applicable, assuming that buyers have sufficient savings for the 10 percent downpayment.
- Assumed applicants are aged 35 & below and household consists of two adults with no other financial commitment. The stamp, conveyancing and other fees payable to buy a flat are not included in the table.

9. UPGRADING PROGRAMMES AND ESTATE RENEWAL

Even as we provide various commercial, recreational, and social amenities in our towns for residents' convenience, one key priority is ensuring that they meet evolving needs and circumstances. Through renewal and upgrading programmes, older estates and towns are given a new lease of life, revving up their vibrancy and continued relevance.

LIFT UPGRADING PROGRAMME (LUP)

The LUP upgrades lifts to achieve direct lift access on every floor where feasible, so that residents, especially the elderly, disabled and families with young children, can access their homes conveniently.

HOME IMPROVEMENT PROGRAMME (HIP)

The HIP resolves common maintenance problems of ageing flats such as spalling concrete, in a systematic and comprehensive way.

ENHANCEMENT FOR ACTIVE SENIORS (EASE) PROGRAMME

EASE enhances the safety and comfort of seniors living in HDB flats. We offer EASE in conjunction with the Home Improvement Programme (HIP). This allows works for both programmes to be carried out at the same time. Elderly and vulnerable residents who need EASE earlier, or whose blocks do not qualify for HIP, could apply directly to HDB for EASE.

NEIGHBOURHOOD RENEWAL PROGRAMME (NRP)

The NRP provides precinct and block improvements to older housing estates, with an emphasis on the active engagement of residents in the shaping of their living environment.

SELECTIVE EN BLOC REDEVELOPMENT SCHEME (SERS)

The Selective En bloc Redevelopment Scheme (SERS) renews older housing estates. It offers residents the opportunity to move to new homes and a better living environment served by modern facilities. With the rehousing of residents en bloc, SERS enables residents to preserve family and community ties built over the years. The injection of new developments also helps to rejuvenate the old HDB estates, and revitalise their demographic and economic profiles as younger residents move into the estates.





REMAKING OUR HEARTLAND

The Remaking Our Heartland programme aims to transform young, middle-aged and mature HDB towns and estates into distinctive and endearing homes for Singaporeans, and meet the changing needs of an ever-evolving community. This is done through:

- Rejuvenating homes, towns and neighbourhood centres
- Enhancing outdoor recreation choices
- Improving connectivity to activity nodes
- Fostering heartland identity and heritage

10. SUSTAINABLE AND SMART LIVING

HDB consciously plans for greenery and incorporates sustainable features and initiatives in both new and existing housing estates.

We advocate green consciousness by developing eco-friendly and sustainable homes. Since 2014, all new HDB flats come with a standard suite of eco-features which include:

- Eco-pedestals in bathrooms, which recycle water for toilet flushing;
- LED lighting with motion sensor controls and regenerative lifts that help to lower energy consumption; and
- Centralised Chutes for Recyclables to promote sustainable living.

Punggol — HDB's First Eco-Town

Selected as HDB's first eco-town in tropical Singapore, Punggol spearheads multiple initiatives for sustainable living. The Treelodge@Punggol and My Waterway@Punggol are two successful developments which mark Punggol as a sustainable waterfront town of the 21st century.

The Treelodge@Punggol, HDB's first eco-precinct, integrates environmental features that focus on effective energy, water and waste management, in line with our goal of designing environmentally-friendly residential projects. Many of Treelodge@Punggol's green features have since been included in new public housing developments.

My Waterway@Punggol, Singapore's longest man-made waterway, is a scenic showcase of green technologies. From the freshwater mangrove that cleanses the water, to the themed outdoor furniture made using recycled materials, the 4.2km waterway encapsulates the vision of 'Green living by the waters', and is testament to our commitment of providing a quality living environment for residents.



HDB Greenprint — Transforming Existing Estates into Greener Homes

To bring sustainable living into existing public housing estates, HDB introduced the HDB Greenprint programme in 2012, with Yuhua estate in Jurong East selected as the first estate to be transformed into a green neighbourhood. Under the programme, a host of green features has been implemented in Yuhua, such as solar panels, sensor-controlled LED lightings, pneumatic waste conveyance system, and vertical greenery, enabling residents to enjoy a cleaner and better living environment. The HDB Greenprint is also being implemented in Teck Ghee in Ang Mo Kio, as part of HDB's efforts to bring green living to more residents.

Smart HDB Homes of the Future

To realise Singapore's Smart Nation vision, HDB has also developed a Smart HDB Town framework. Capitalising on the latest Information and Communication Technology (ICT), the framework will help drive initiatives to enhance liveability, efficiency, sustainability and safety in HDB towns and estates. The focus is on five key dimensions — Smart Planning, Smart Environment, Smart Estate, Smart Living, and Smart Community. HDB constantly pursues new ideas and innovations, harnessing these digital advancements to further improve our planning and design. Punggol Northshore, HDB's first Smart and sustainable district, will be a test bed for our Smart initiatives.



11. COMMUNITY BONDING

With over 80 percent of Singapore's resident population living in HDB flats, public housing plays a crucial role in maintaining social harmony in multi-racial, multi-cultural and multi-religious Singapore. To this end, HDB provides a living environment where Singaporeans of different races and socio-economic groups have opportunities to come together, mingle and bond as a community.

PROMOTING SOCIAL HARMONY AND INTEGRATION

Physical Design

- To encourage social interaction and promote community bonding amongst residents, HDB plans and designs a variety of shared spaces and social facilities such as fitness corners and playgrounds.
- We ensure a good mix of flat types and sizes within each HDB block and precinct to cater to different socio-economic groups.

Public Housing Policies

- The Ethnic Integration Policy (EIP) promotes racial integration and harmony, and prevents the formation of racial enclaves. Based on the ethnic make-up of Singapore, a quota is set for each ethnic group in each block and neighbourhood, to ensure a balanced mix of various ethnic communities in HDB towns.
- The Singapore Permanent Resident (SPR) Quota ensures that non-Malaysian SPR families can better integrate into the local community for social cohesion, and prevents enclaves from forming in the public housing estates. The SPR quota is set at 5 percent and 8 percent at the neighbourhood and block levels respectively.

Community Bonding Programmes

- HDB organises activities such as MyNiceHome roadshows for residents of newly-completed precincts to get to know their new neighbourhood and neighbours, as well as assists in the setting up of community gardens, to enable residents to foster strong community ties through gardening. A variety of exciting activities is also planned for HDB's town and community plazas, to liven up these common spaces. In addition, an HDB Friendly Faces, Lively Places Fund is available for residents to champion ground-up projects for their communities.
- We also recognise individuals who demonstrate exemplary acts of care and neighbourliness through the Good Neighbour Award, as well as conduct public talks and workshops to promote gracious and responsible heartland living.



12. PUBLIC RENTAL SCHEME

HDB provides rental flats for those who are not ready to own their homes. These flats under the Public Rental Scheme are heavily subsidised to cater to Singapore Citizen households who have no other housing options or family support.

ELIGIBILITY CONDITIONS

- Singapore citizen
- Applicants must be at least 21 years old and form a family nucleus*
- Total monthly household income should not exceed \$1,500
- Single applicants must be at least 35 years old
- Must not own / have an estate or interest in such a property:
 - HDB Flat or Design, Build & Sell Scheme Flat
 - Local or overseas private property (house, building, or land), residential or otherwise
 - Executive Condominium

* Comprising married couples with or without children; divorced/ widowed person with children; fiancé and fiancée or orphaned siblings

** Single persons who are widowed or orphaned must be at least 21 years old.

RENTAL RATES

Monthly Household Income	Household Type	Monthly Rent*	
		1-Room	2-Room Flexi
\$800 or below	First-timer	\$26 - \$33	\$44 - \$75
	Second-timer	\$90 - \$123	\$123 - \$165
\$801 - \$1,500	First-timer	\$90 - \$123	\$123 - \$165
	Second-timer	\$150 - \$205	\$205 - \$275

* Prevailing monthly rent

13. ESTATE MANAGEMENT

HDB BRANCHES

HDB has 22 branches and three service centres strategically located in each town to provide post-allocation services, which include lease and tenancy matters, and car park management. This decentralised system ensures that residents' needs are met on the ground quickly.

TOWN COUNCILS

Estate management functions of the common areas in housing estates are carried out by Town Councils, including routine and cyclical maintenance as well as repair works. Flat owners pay monthly Service & Conservancy Charges to their Town Council based on their flat type, citizenship, interest in private property ownership, etc.

Service & Conservancy Charges flat owners pay to Town Councils as at March 2017:

Flat Type	Monthly Charges
1-Room	\$18.50 - \$21.00
2-Room	\$26.50 - \$31.50
3-Room	\$40.50 - \$44.00
4-Room	\$53.50 - \$57.00
5-Room	\$67.00 - \$69.50
Executive	\$85.50 - \$93.50

UTILITIES

Flat owners pay the service provider directly for utilities such as electricity, gas and water.

Utilities	Monthly Charges
Electricity	23.29¢/kWh
Gas	19.02¢/unit
Water	(a) 1 - 40m ³ = \$1.17/m ³ (b) above 40m ³ = \$1.40/m ³



HDB Hub, 480 Lorong 6 Toa Payoh, Singapore 310480

Tel: (65) 6490 1111 | Fax: (65) 6397 2070

HDB InfoWEB: www.hdb.gov.sg



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Oct 2019



Agency for
Science, Technology
and Research

OVERVIEW

CREATING GROWTH, ENHANCING LIVES

ABOUT SINGAPORE

RIE2020 DOMAIN-BASED GOVERNANCE FRAMEWORK

Prioritisation of RIE agenda into four technology domains aligned to areas of competitive advantage and/or national needs

DOMAINS (VERTICALS)



Advanced Manufacturing
and Engineering (AME)

Support growth &
competitiveness of
manufacturing &
engineering sectors



Health and Biomedical
Sciences (HBMS)

Advance human health &
wellness, and create
economic value for
Singapore & Singaporeans



Services and Digital
Economy (SDE)

Leverage digital innovation
to create economic
opportunities and meet
national priorities



Urban Solutions and
Sustainability (USS)

Develop a sustainable &
livable city through
integrated solutions for
Singapore and the world

Cross-cutting Programmes (Horizontals)



**Academic
research**

Build up a significant base of capabilities and a pipeline of ideas that can drive the next phase of growth



Manpower

Build a strong research and innovation community



**Innovation &
Enterprise**

Build a strong core of innovative enterprises that drive value creation and economic competitiveness

SINGAPORE'S RESEARCH ECOSYSTEM



A*STAR

MISSION

We advance science and develop innovative technology to further economic growth and improve lives



Biomedical Research Council (BMRC)



Science & Engineering Research Council (SERC)



A*ccelerate



A*STAR Graduate Academy

11 Research Entities

9 Research Entities

Commercialisation

Scholarships



>5,000
Staff



>4,000
Researchers, Engineers and
Technical Support Staff



~ 40%
from >60 countries

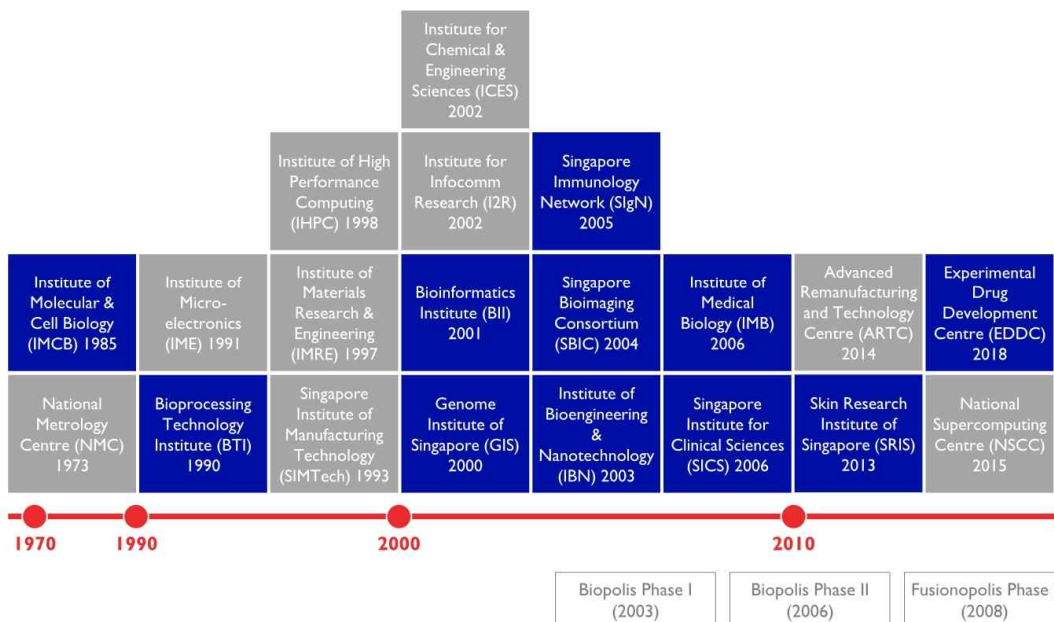


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Passion
Made
Possible

A*STAR'S RESEARCH ENTITIES

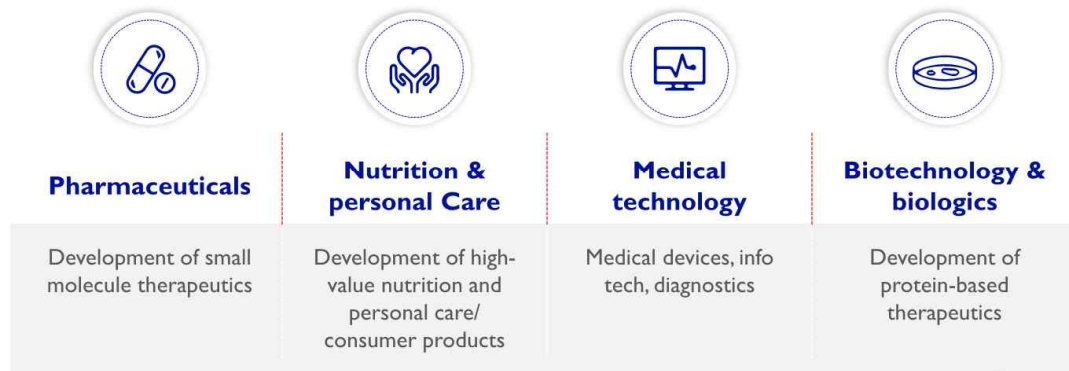


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Passion
Made
Possible

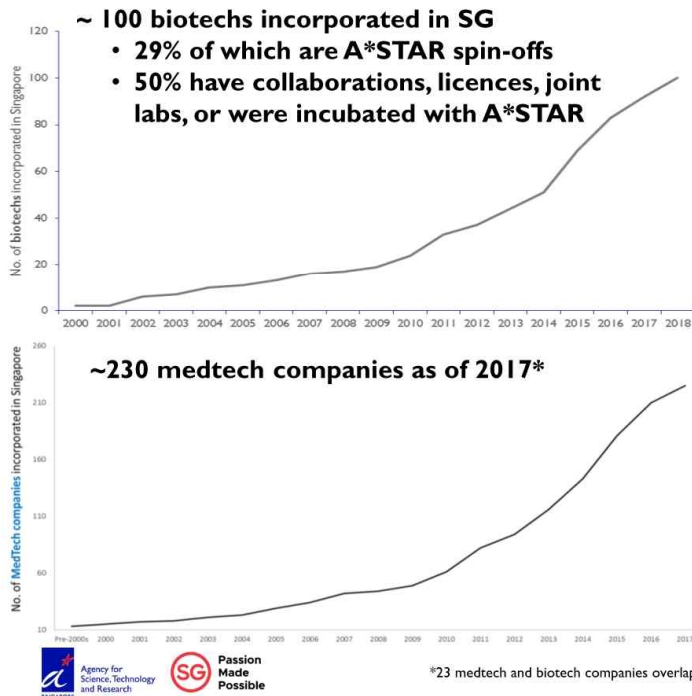
CORE BMRC CAPABILITIES



BMRC ORGANISATION



GROWTH OF LOCAL BIOTECH/MEDTECH ECOSYSTEM



In 2018, there have been >US\$350M in deals and investments for Singapore biotech

Biomedical Sciences Singapore: The next lap
Keeping an eye on the prize in Singapore's biomedical journey

Tessa Therapeutics Closes USD 80 Million Financing Round Led by Temasek
- Proceeds to be used to further develop Tessa's advanced solid tumor immunotherapy pipeline
- Funding round reinforces Tessa's position as an emerging leader in cellular immunotherapy with the vision of bringing transformational change to cancer therapy

Lion TCR Raises US\$20 Million In Series A Funding

Biotech expected to be key driver of future economy

PARTNERING LOCAL BIOTECHS AND MNCS THROUGH OPEN INNOVATION

Joint Labs

TESSA **Institute of Molecular and Cell Biology**
Focus on advanced T cell technologies and novel chimeric antigen receptor (CAR) technologies in combination with Tessa's T cell platform.

One BioMed **Integrated Molecular Diagnostics** **Genome Institute of Singapore**
Joint lab to develop molecular diagnostic assays for the Asian clinical infectious disease testing market.

Licensing & Co-development

LION TCR **Singapore Institute for Clinical Sciences**
T cell engineering technologies

Euchloe Bio **Singapore Immunology Network**
Mabs against immune checkpoints

GE Healthcare **Agency for Science, Technology and Research**
Imaging diagnostics and patient monitoring

Joint Projects

INVITROCUE™ **Genome Institute of Singapore**
Developing tumour models to enhance clinical decision-making

immunoSCAPE **Singapore Immunology Network**
Immune profiling for response to treatment

MERCK **Agency for Science, Technology and Research**
Cellular delivery of macrocyclic peptides

Startup Incubation

A*STAR CENTRAL **ETPL**
Co-innovation space to incubate, develop, train and support technopreneurs to build successful startups and business ventures.

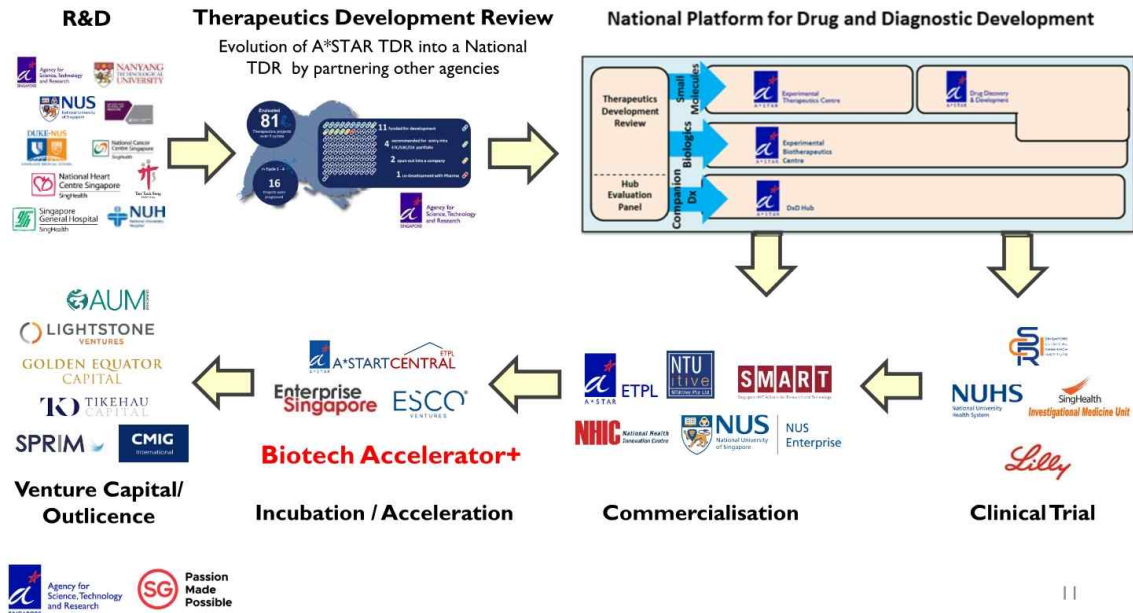
Examples of past and present members

MEDISIX THERAPEUTICS CAR-T cell therapy
TYCHAN Platform to speed up candidate biologics to clinical trial
LUCENCE DIAGNOSTICS Liquid Biopsy Molecular diagnostics
engine BIOSCIENCES AI platform for drug discovery
privi™ Hemorrhoids Treatment device

PUBLIC SECTOR SUPPORT AND ENABLERS FOR THE BIOTECH ECOSYSTEM

Anchoring the public sector drug development effort in Singapore

ETC/EBC/D3 and the IMUs enables multiple entry points for local Biotechs or MNCs to co-develop assets or to license the end product of these units.



BIOPOLIS AS AN ACCELERATOR+



KEEPING BIOPHARMA MANUFACTURING COMPETITIVE THROUGH TECHNOLOGY INNOVATION AND DEVELOPMENT

Leveraging on Manufacturing Technology Innovation and Development to:

- Enable plants to be more flexible to take on diverse product portfolio
- Assess critical quality attributes of products and maintain high level of process control
- Support industrial-scale manufacturing processes



Strengthening the Existing Manufacturing Base through Process Innovations



Preposition Singapore for Manufacturing of New Therapeutic Modalities

Small Molecules



Pharma Innovation Programme Singapore (PIPS)

Biologics



EDB and A*STAR participating in Biophorum Technology Roadmap Workshops

Cell Therapy

R&D programmes in cell manufacturing technologies:

- Autologous T Cell Therapy Manufacturing
- Mesenchymal Stem Cell Manufacturing
- Critical Analytics for Manufacturing Personalized-Medicine Programme



Agency for Science, Technology and Research

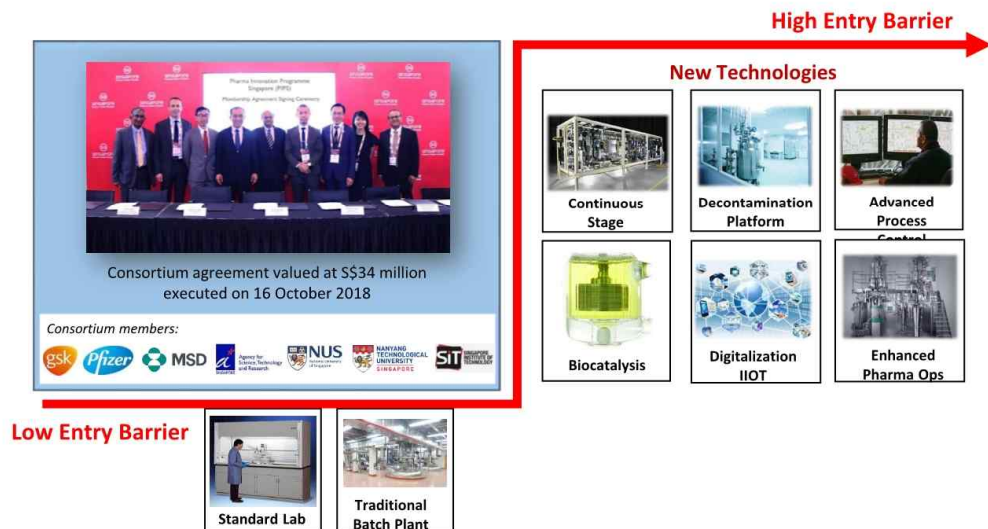


Passion Made Possible

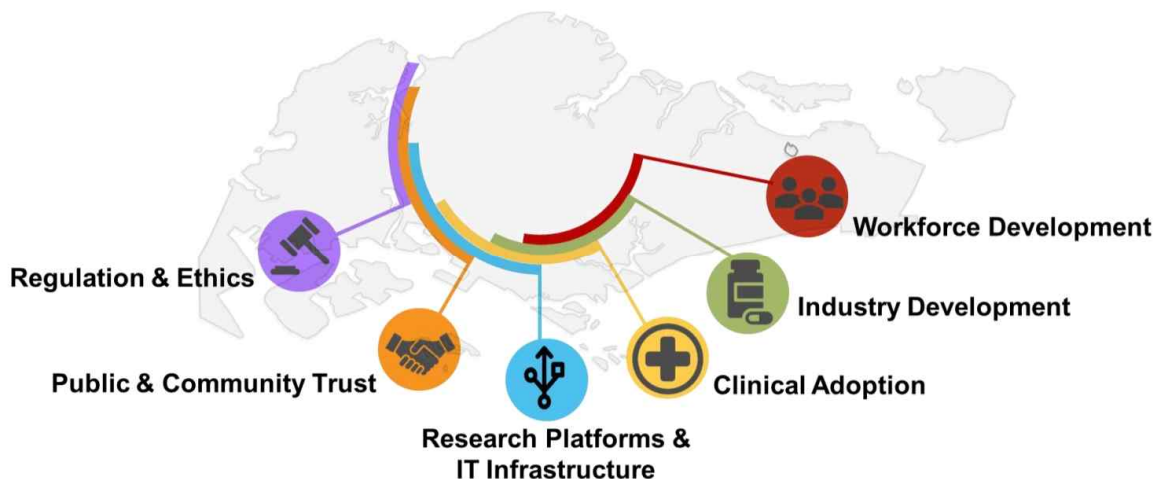
Programmes

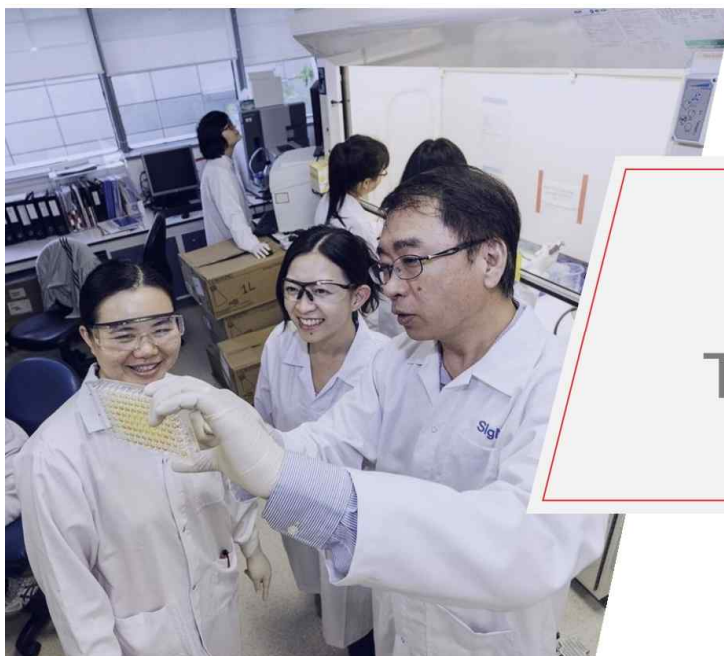
Pharma Innovation Programme Singapore (PIPS)

Vision: Lead the global transformation of pharmaceutical manufacturing to create unique value for patients, pharma & Singapore



NATIONAL PRECISION MEDICINE PROGRAMME





OUR TALENT



Agency for
Science, Technology
and Research



Passion
Made
Possible

17

OUR TALENT

A*STAR'S TALENT STRATEGY

Strong core of Singaporean research talent, complemented by
rich diversity of international researchers



Creating the Pipeline

STEM Outreach to improve
STEM pipeline and enthuse
young to take up science &
research as a career



Investing in the Pipeline

Scholarships strategy to meet
scientific talent needs

- Singaporean core
- International diversity
- Sizing of scientific talent
needs



Developing the Pipeline

Post-PhD development
of early career researchers, and
development of leaders



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and Research



Passion
Made
Possible

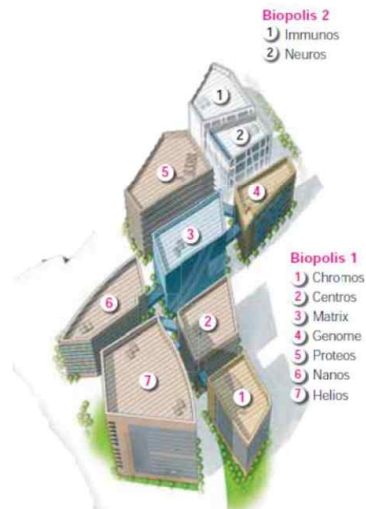
18

BIOPOLIS

Singapore's **biomedical** research hub at one-north

Home to 53 BMS companies & growing

Phase I to 5	<ul style="list-style-type: none"> 5,600 employees 335,000 sqm (GFA)
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Research Support Centre

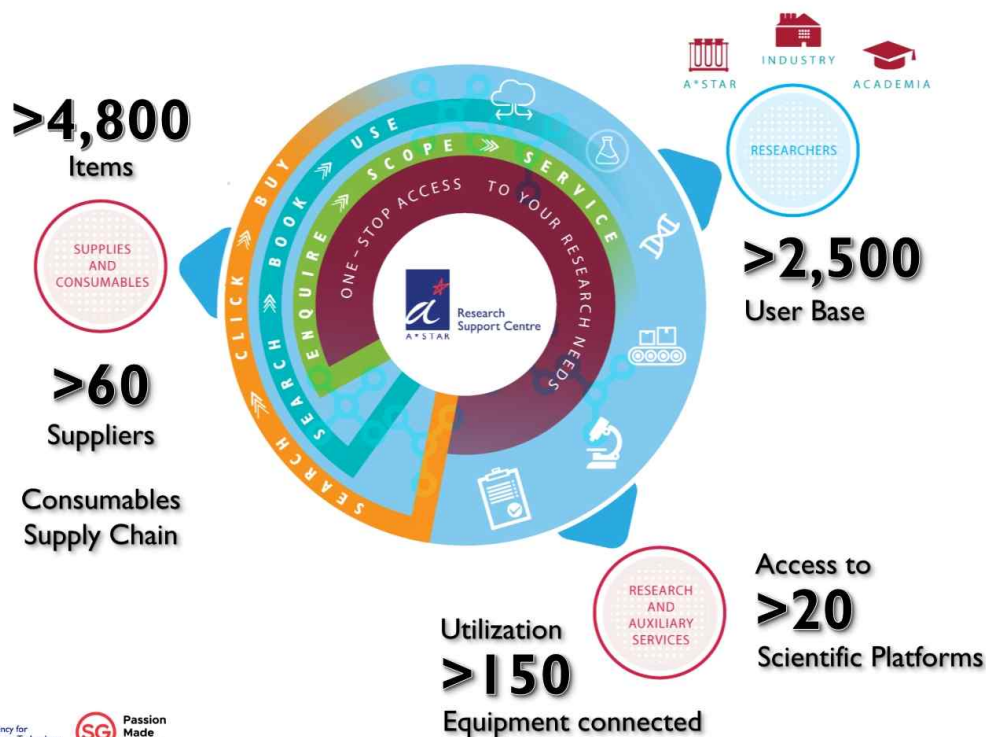
One-stop for Scientific Services and Consumables

Graham Wright, PhD
24th October 2019

RSC facilitates ease of access *for users* in the research ecosystem, and operates back-end service administration *for Scientific Platforms*



AN ENABLER FOR RESEARCH A CHANNEL FOR ENGAGING RESEARCH PLATFORMS



Laboratory Consumables

Largest e-Platform for laboratory consumables and reagents



Scientific Services (1 of 2)

Enabling researches in cost-effective ways & by providing easy access to high-end equipment



Scientific Services (2 of 2)

Web platform for outsourcing life science research

Connects academia and commercial to research expertise and services from a network of scientific platforms

as at end of FY18

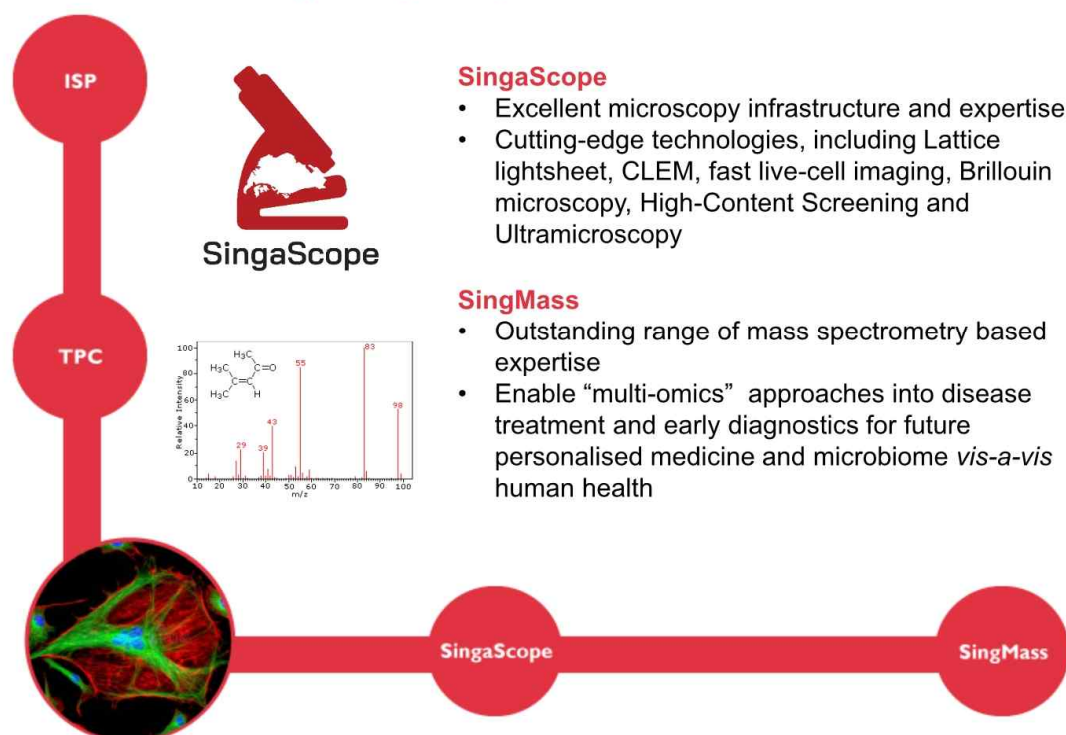


72 SMEs
91 MNC



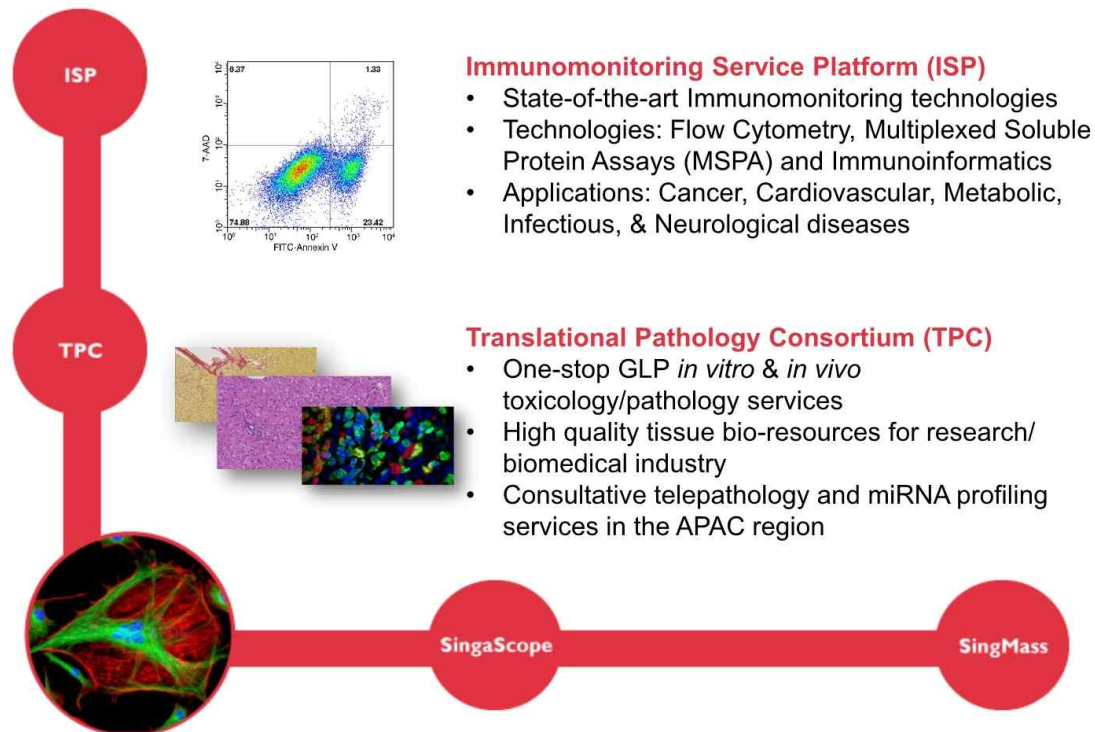
National Shared Infrastructure Platforms

State-of-the-art technology and high quality scientific services



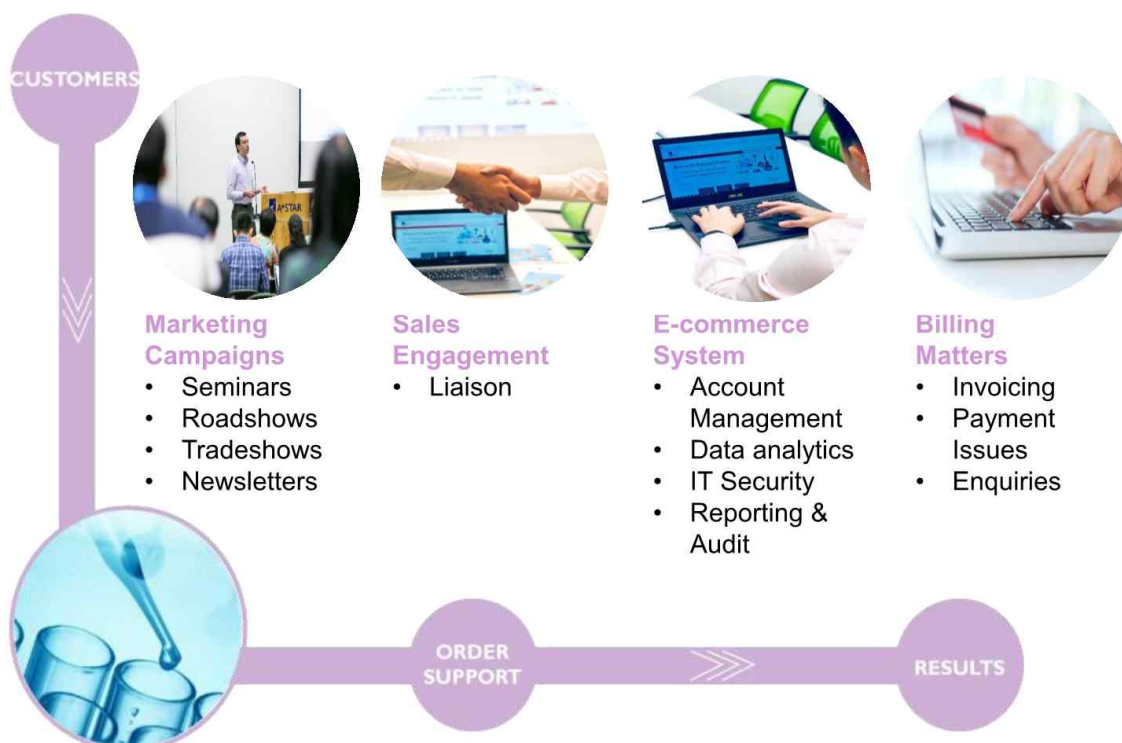
National Shared Infrastructure Platforms

State-of-the-art technology and high quality scientific services



Support for Services Platforms

Keeping scientists focused on research & discovery, and offer relieve from business admin



Thank You

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