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中非农业现代化合作：现状、挑战与新征程

CHINA-AFRICA AGRICULTURAL MODERNIZATION COOPERATION: SITUATION, CHALLENGES AND THE PATH AHEAD

中非农业现代化合作：

现状、挑战与新征程

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目录

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缩写表

AgriTT	中英非三方农业合作项目—合作伙伴关系加速农业技术转移
ATDC	农业技术示范中心
AU	非洲联盟
BMGF	比尔及梅琳达·盖茨基金会
CAADP	非洲农业综合发展计划
CAAS	中国农业科学院
CIDCA	中国国际发展合作署
CIRAD	法国国际农业发展研究中心
DAC	发展援助委员会
DFID	英国国际发展部
DRC	刚果民主共和国
FAO	联合国粮食及农业组织
FECC	农业农村部对外经济合作中心
FOCAC	中非合作论坛
FTE	人员全时当量
GDP	国内生产总值
G8	八国集团
IFAD	国际农业发展基金
IFPRI	国际食物政策研究所
MOU	谅解备忘录
NAIP	国家农业投资计划
NEPAD	非洲发展新伙伴计划
NGO	非政府组织
NPO	非营利组织
ODA	官方开发援助
OECD	经济合作与发展组织
R&D	研究与开发
SDGs	可持续发展目标
SSC	南南合作
UNDP	联合国开发计划署

摘要

近年来，非洲农业生产获得了快速增长，与此同时，非洲国家也经历了经济结构的迅速转型，农业在国内生产总值中所占的比例明显降低。然而，对非洲国家而言，农业部门所占就业比重仍然较高，农业依然是最重要的产业之一，是解决粮食安全问题和减少贫困的关键。非洲拥有丰富耕地和农业资源，但相当大一部分并未被合理开发使用，其农业生产率相对于世界其他地区仍然处于较低水平。非洲农业发展仍然面临诸多挑战，主要包括：不明晰的土地产权政策、落后的农业基础设施、低水平的农业科研体系、区域市场整合程度低、私营部门发展不足、国际粮食价格波动和气候变化的消极影响，以及政局不稳和社会动荡等。基于自身能力和资金的欠缺，非洲国家需要广泛借助国际资源、技术和经验以确保可持续的农业发展。

长期以来，海外投资者对非洲农业领域的关注相对不足，传统捐助国提供的援助也远远不能满足非洲农业发展的需求。在这种情况下，近年来中国与非洲之间日益加强的农业合作受到越来越多的关注。一方面，中非双方的资源禀赋存在很强的互补性，使得双方的合作有潜力实现互利共赢。另一方面，中国作为新兴参与主体在国际发展援助中正发挥着日益重要的作用。在2015年中非合作论坛峰会上，中国宣布了中非合作的十大领域，并承诺提供600亿美元资金支持，而中非农业现代化合作也被列为十大关键合作领域之一。2018年中非合作论坛北京峰会上，中国进一步承诺提供600亿美元以支持八大行动计划，包括同非洲一道制定并实施中非农业现代化合作规划和行动计划。

中国对非洲的农业援助范围不断扩大，主要以四种模式开展：援建农业技术合作项目、加强农业发展的能力建设、农业专家对外派遣和建设农业技术示范中心。自1959年以来，中非农业合作已经从最初的无偿援助逐渐深化和扩展到包括农业贸易和投资的更广泛领域。中国对部分非洲国家采取零关税的政策以来，中非农业贸易快速增长。自2006年起，中国对非洲的农业投资也不断增加，主要集中在种植业领域，并日益呈现多元化趋势。在中国对非洲的农业投资中，私营部门开始发挥日益重要的作用。

同时，中非农业合作机制不断完善。从最初以传统的双边合作为主，逐渐建立起中非合作论坛的多边对话机制，并引入了与国际组织、发达国家和民间非营利组织等第三方机构的三方合作机制。在中非合作论坛等机制的促进下，中非农业合作取得了一系列成果，尤其是在农业技术交流和人员培训以及建设农业技术示范中心等方面。

虽然中非农业合作取得了一些进展，但实践中还存在许多问题和挑战，需要在未来的中非农业现代化合作中加以解决和改善。首先，中非农业合作缺乏综合战略规划和统筹协调，存在碎片化的问题；其次，此前的中非农业合作大多停留在技术层面，缺乏政策、制度和社区经验分享；第三，中国赴非参与农业合作和农业援助的机构和企业，往往倾向于依赖以当地政府为主的单一沟通渠道，而缺乏与当地社会、私营部门、专业人员、社区层面机构和其他双边发展合作机构的协作和联系；第四，中国在非洲的农业项目缺乏以当地需求为导向，存在可持续性不足的问题；第五，中非人员交流存在语言、文化障碍和能力欠缺；此外，国际舆论环境的压力也使合作项目的开展面临更大困难。

伴随近年来逆全球化的潮流，贸易保护主义政策有所抬头。这加剧了世界农产品贸易的不确定性，对中国和非洲的粮食安全和农业发展带来了巨大挑战。中国需要寻求更加多元化的农业贸易和农业合作伙伴。在“一带一路”倡议下，农业国际合作也成为沿线国家共建利益共同体和命运共同体的最佳结合点之一。非洲是“一带一路”建设的关键伙伴，同时具有发展农业的巨大潜力。加强农业合作对于中非双方都具有重要意义。

在新时期，为了更好应对这些挑战，实现中非农业合作的潜力，建议把中非农业合作制度化，并制定一个综合战略规划指导未来的中非农业现代化合作。该综合战略规划将有助于指导和协调中国对非的投资和援助，并在合作过程中与非盟成员国推动农业发展的关键努力相对接。规划需要把中国对非洲的援助计划与非洲各国自身的农业发展计划和政策相结合，体现“非洲农业综合发展计划”（CAADP）和“2063议程”中明确提出的需求和目标。通过制定规划，梳理中非双方在大陆层面、区域层面和国家层面的合作，还有助于丰富和深化中非农业合作的层次。在制定规划的过程中，尤其需要关注以下几方面问题：第一，应该将政策研究和战略规划放在优先位置，开展有效的政策对话；第二，中非农业合作应当以当地的农业发展需求为导向，与非盟实施 CAADP-马拉博宣言2017-2021的商业计划相对接；第三，基于当地需求，定位出中非农业合作的重点投资领域；第四，要在实证研究的基础上总结好中国农业发展的经验教训，筛选出同样适合非洲发展的经验，建立并改进知识分享的平台和形式，做好经验分享工作；第五，要改善中非农业合作过程中的商业运营能力，扩大私营部门的参与，提高项目的可持续性；此外，要加强与国际组织、双边机构和非营利组织的三方合作，做好第三方评估、影响研究和发展传播，整合各方资源和优势，协力促进非洲的农业和经济发展，确保其粮食安全，减少贫困。

中非农业现代化合作：
现状、挑战与新征程

1. 经济转型下非洲农业发展的现状与挑战

非洲大部分地区正在经历快速的经济转型[1]。20世纪90年代末以来，非洲经济实现了近二十年的整体快速增长，农业产值和就业所占的比例持续下降。尽管如此，当前农业仍然是非洲最重要的部门之一。一方面，在非洲，农村人口仍然占大多数，而农业部门是非洲大部分农村人口的主要收入来源[2]，是非洲解决人口快速增长背景下饥饿问题的关键[3]；另一方面，农业是非洲经济转型的引擎[4]，农业生产力的提高对非洲经济发展和结构转型至关重要，在非洲大多数国家的经济发展初期，农业是一个国家收入和就业的主要来源。研究显示，农业推动的增长对于非洲减贫的贡献大于非农业部门推动的增长[5]。然而，当前非洲农业的发展还面临着气候变化、自然资源退化、冲突和难民危机等诸多严峻挑战，仅凭非洲国家自身之力难以有效应对这些挑战，寻求广泛的国际合作则成为推动非洲农业发展的有效对策。

1.1. 经济转型与非洲农业发展的现状

1.1.1.非洲经济结构转型的背景

进入21世纪以来，非洲成为世界上经济增长最快的地区之一，仅次于东亚[6]。非洲经济的快速增长伴随着城市化和经济结构的转型，农业、制造业和服务业对国内生产总值（GDP）的相对重要性发生转变[7]。

非洲经济转型的关键特征首先体现在农业在 GDP 和就业中占据的份额持续下降[8]，根据世界银行统计的数据，2002年农业在撒哈拉以南的非洲 GDP 中所占份额为25.35%，到2016年已经逐步下降并基本维持在17%~18%的水平；根据联合国粮农组织（以下简称“粮农组织”）统计的数据，1991年非洲农业部门吸收就业的比例超过60％，而这一数据在2016年逐渐下降至53％。非洲经济转型的另一关键特征在于，如上文提到的数据所示，农业在 GDP 中所占的份额与农业在劳动力中的份额之间存在着巨大的差距。特别是近年来，非洲农业劳动力比重的急剧下降并没有带来人均国内生产总值的显著增加[9] [10][11]。

当前，非洲的经济转型已经由对经济增长起负面作用的结构变化转变为促进经济增长的结构变化，但总体而言，尽管经历了结构转型的不断努力，非洲经济转型的程度与其它发展中国家相比仍然较低,并且这个过程还很不完整[1]。与世界上其他很多地区不同，非洲农业 GDP 份额的下降并没有伴随着制造业部门的扩张，而是伴随着以非正式经济活动为主的服务业部门份额的迅速上升。因此，非洲在经历经济结构转型的同时，其工业部门所占就业的比例并没有显著增加[12]。

1.1.2.非洲农业生产发展现况

新世纪以来，伴随着经济的增长，非洲农业也实现了自独立以来最长时期的持续增长，非洲各地区都实现了农业增长，农业总产量显著提高。根据世界银行数据，自2000年以来，撒哈拉以南非洲的农业年均增长率约为9.4%[1]，虽然在2008年粮食危机期间及2014-2016年略有停滞，整体来看，2000~2017年，其农业增加值几乎增长了四倍。

土地耕作面积的扩大是过去几十年非洲的农业增长的重要原因。根据粮农组织统计的数据，非洲可耕地和永久作物面积从1961年的1.673亿公顷增加到2015年的2.718亿公顷。然而非洲的农业生产率和单位面积作物产量仍然处于较低水平，目前非洲平均每公顷作物产量不到世界平均水平的一半，农业人均生产指数[2]也仅从1961年的93.64增长到2016年的98.86。相较而言，非洲的农业生产力，包括劳动力和土地生产力，都落后于亚洲和南美洲等其他发展中国家和地区[13]。

非洲农业增长的波动性和地区内差异性也较大。根据粮农组织的数据，2016年，南部非洲的谷物产量为3.27吨/公顷，已经接近世界平均水平；北非和东部非洲产量较为接近，均不到世界平均产量的一半；西非的谷物产量也相对较低，为1.24吨/公顷；而中部非洲谷物产量最低，仅为1.05吨/公顷，远远低于世界平均产量[14]。

1.1.3.非洲主要作物的发展情况

20世纪80年代以来，随着非洲饮食习惯的改变，其主要种植作物的结构也发生了一些变化。传统的小米和高粱等谷物的地位已迅速下降，正在被大米和小麦取代，但传统主食玉米继续在东部和南部非洲的饮食中占主导地位，并在非洲其他地区也出现强劲增长[13]；玉米和木薯仍是西非和中非最重要的粮食作物[15]。自20世纪90年代初以来，非洲广泛采用改良玉米，小麦和水稻品种，也促进了这些主要作物产量的增加。

大米在非洲的饮食结构中比重迅速增加，然而非洲水稻产量有限，稻米需求严重依赖进口。在1961年至2017年间，撒哈拉以南非洲国家进口稻米量由43.1万吨增长至1416.5万吨[3]。而随着需求的增加，非洲水稻种植面积也迅速扩大，1961年非洲水稻种植面积不足300万公顷，到2016年已经显著增加到1250万公顷[4]。

玉米仍然是非洲最重要的粮食作物，根据粮农组织的数据，非洲玉米种植面积从1961年的1546.1万公顷增加到了2016年的3661.1万公顷，单位面积产量也从1.04吨/公顷提高到了1.93吨/公顷, 增加近一倍，但仍然不足世界平均水平的一半。

长期以来，非洲小麦的种植面积一直维持在1000万公顷左右，虽然种植面积没有显著扩大，但是随着改良品种和化肥的使用以及灌溉条件的改善，小麦的产量也随着单产的提高实现了强劲增长。1961年以来，非洲小麦单产增加了近三倍，从0.69吨/公顷提高到2016年的2.60吨/公顷，日益接近世界平均水平（3.41吨/公顷）[14]。

[1] 根据世界银行2018年数据，2000年撒哈拉以南非洲的农业增加值（以现价美元计算）为632.77亿美元，2017年为2909.85亿美元。

[2] 人均净生产指数（2004-2006 = 100）。

[3] 撒哈拉以南非洲地区水稻进口数据，USDA, 1961-2017。

[4] 非洲水稻收获面积，FAO，1961-2016。

1.1.4.非洲农业研发现状

非洲农业研发的投入水平和人员数量在过去40年里经历了持续的发展。撒哈拉以南非洲的农业研发投入水平在20世纪90年代经历发展停滞后，从2000年起进入持续增长，由2000年的12亿美元增长至2011年的17亿美元[1]。农业研发的人员数量在2000年以后也经历了快速增长，2000-2011年间增长了50%，增加至约14500人[2]。

但是，非洲的农业研发投入存在显著的区域不均衡性。据统计，尼日利亚、南非和肯尼亚三国占了非洲研发投入的一半，但是，在统计的38个非洲国家中，有18个国家的农业研发投入仍然低于1000万美元。还有一些小国家，尤其是法属西非地区，2000年至2011年农业研发投入呈现负增长状态[16]。此外，与全球其他区域相比，非洲农业研发投入更多地依赖其他国家和发展银行的资金，导致农业研发处于高波动的脆弱状态，难以开展长期规划。

非洲农业研发的主体始终以政府部门为主，近年来高校正逐渐在农业研发中扮演越来越重要的角色，而非营利机构和私营部门目前仍然仅发挥着有限的作用。

1.1.5.农业公共资金投入

整体来看，非洲的农业公共资金投入不足，农业在总支出中的占比远远低于世界其它地区[17]。20世纪80年代，非洲农业支出的占比在6%以上，但是到90年代，结构调整导致农业支出大幅下降，农业支出占比平均下降到2%到3%的水平；新世纪以来，非洲国家开始重新重视对农业的投入，尤其是2003年非洲联盟国家元首和政府首脑在《马普托宣言》中承诺每年将有至少10%的预算投入到农业领域之后。2003-2008年，非洲农业公共投入开始以每年6.6%的速度迅速增长[18]，而2008粮食危机以来增速又有所放缓，到2015年，非洲平均农业支出占比约为4%左右[17]。

然而，非洲农业投入存在地区间的不平衡，事实上，到2014年只有布基纳法索、马拉维、莫桑比克和津巴布韦实现了农业投入10%的目标[4]，大多数非洲国家远远没有实现这一目标，而一些原本农业投入较低的国家甚至进一步减少了农业公共支出。

另一方面，非洲农业公共投入的效率不高，农业投入每增加1个百分点，对农业产出和生产率的提升约为0.1%~0.3%，农业投入的整体回报率只有11%左右[17]。而农业生产部门之间公共资金投入的比例差别也很大，政府往往更倾向于扶持主粮作物，家畜饲养则是长期被忽略的部门[4]。

1.2.非洲农业发展面临的挑战

尽管过去十年里非洲农业取得了显著的增长，非洲国家仍然面临严峻的粮食安全形势。根据 FAO 数据[19]，近年来全球饥饿人口有所增加，2016年营养不良人口增加了3800万，这在非洲尤其严重。根据“全球饥饿指数”，非洲大多数国家的饥饿水平处于“严重”或“警戒”的级别，而撒哈拉以南非洲的饥饿水平为“严重”[20]。而改善农业和食物系统是解决这一问题的核心所在。然而，当前非洲农业发展仍然面临诸多挑战，阻碍了其农业生产力和作物产量的提升。非洲农业发展面临的挑战主要包括以下七个方面[21] [22]：

[1] 以2005年购买力平价计算。

[2] 人员数量采用人员全时当量（FTE）统计，人力资源和财务数据考虑了研究人员在研发上花费的时间与其他活动的比例; 因此，3个科学家每人将一半的时间花在农业研究上，将被算作1.5个 FTE。

第一，不明晰的土地产权政策。非洲普遍存在土地产权和使用权不明确的问题，缺乏制度和法律的保障，带来土地权利的不确定性，并且伴随着土地分配的不平衡，在很大程度上影响了土地的集中程度，阻碍了农业规模化和机械化的发展。

第二，落后的农业基础设施。非洲国家的农业生产普遍面临农业基础设施薄弱的问题，缺乏灌溉、电力、运输和储存等方面的基本服务。不完善的运输网络限制了进入市场的机会，造成较高的收获后损失水平，也限制了种子、肥料等生产投入的有效配置。

第三，非洲农业科研水平较低，农业公共投入不足。这主要受制于有限的财政资源，并导致非洲农业生产方式较为落后，并且缺乏农产品加工能力，造成农业生产价值链短，产品附加值偏低，难以形成完善的生产体系。

第四，区域市场整合程度低。当前非洲的区域一体化程度较弱，区域内贸易水平相对较低，也限制了农业市场的扩大和整合。

第五，私营部门发展不足，政府部门效率底下。受到体制、结构和政策性因素的限制，非洲对私营部门的支持较少，市场进入的成本和法治的不完善性在很大程度上导致农业私营机构缺乏竞争力，限制了私营机构在农业发展中的作用。非洲的农业发展非常依赖政府和相关机构的推动，然而非洲政府部门效率低下，机构能力不足，也是阻碍农业发展的重要因素。近年来，随着私营部门对非洲经济增长贡献的增加，这一状况有所改善，但如何充分发挥私营部门的潜力，仍然任重道远。

第六，国际粮食价格波动的影响。人口的持续增加、迅速的城市化和人均收入的增加使得许多非洲国家成为农产品的净进口国。而粮食进口依赖程度上升导致非洲很容易受到国际粮食价格波动影响。

第七，气候变化也对非洲农业构成严峻挑战。近年来，受到全球气候变化的影响，非洲农业面临着日益频繁的极端天气和自然灾害的严峻挑战，而水利、灌溉等基础设施的缺乏，也使得非洲的农业生产在面对气候变化因素时尤为脆弱。

此外，非洲一些国家政治局势仍然处于较为动荡的状态，并且伴随着持续的社会冲突，对当地的经济社会发展造成破坏性影响，而农业生产的发展也很容易受到社会动荡因素的阻碍。

1.3.非洲农业对国际合作的需求

非洲国家已经逐渐认识到农业对经济发展和结构转型的重要性。2003年非盟各国首脑签署《关于非洲农业和粮食安全的马普托宣言》，并启动了《非洲农业综合发展计划》（CAADP）以推动对农业的公共投入。该计划是一个大陆范围内的框架，包括非盟各国农业发展的几个共同目标：将农业支出增加到公共支出总额的10%，并使农业部门的年增长率达到6%。CAADP 在国家一级的落实是通过制定、审查和实施国家农业投资计划（NAIP）来完成的。NAIP 规定了旨在实现 CAADP 和其他发展目标的农业部门投资和干预措施。

CAADP 是非洲发展新经济伙伴关系（NEPAD）的农业计划。NEPAD 于2001年通过，作为非洲发展倡议及其与国际社会的伙伴关系的框架。CAADP 延续了 NEPAD 关于非洲所有权和领导的原则和价值观，将发展合作与非洲自身的倡议和优先事项结合起来，将私营部门和其他非国家行为体纳入决策进程，采用了所有伙伴间的相互问责制度。NEPAD 以及 CAADP 的包容性和相互问责原则体现在农业政策制定的参与性和审查的

若干机制中。其中包括多利益相关方的 NAIP 合法化会议；国家级农业联合部门审查，允许各国和非国家行为者开会讨论农业部门的进展并审查履行承诺的状况；以及大陆范围的双年度审查，评估国家和地区实现 CAADP 目标的进展情况。

截至2017年8月，42个非洲国家已开始实施 CAADP，33个国家已完成并使第一代的 NAIP 生效。在 CAADP 的第一个十年期间实施 NAIP 的许多国家正在着手发展第二代 NAIP。

非洲领导人通过签署 CAADP 承诺在农业方面加大公共支出。但由于非洲各国的财政状况面临挑战，以及从他国获取经验教训和技术的需要，因此急需借助更多的国际合作和援助来促进非洲的投资和农业发展。与此同时，国际社会的官方援助相对不足，增长缓慢。20年代中期以来，随着对发展中国家全球农业援助的减少，国际社会对非洲农业的援助进一步缩小。在过去三十年中，分配给农业部门的官方发展援助比例急剧下降，与农业在非洲经济和社会发展中的重要性不相称。自2008年粮食危机以来，非洲对粮食安全等农业领域的国际援助与合作的需求日益突出。但是，传统发达国家的援助有其局限性。例如，2009年，八国集团（G8）承诺向非洲等发展中国家和地区提供至少200亿美元的粮食安全资金，但大多数国家未能如期履行承诺[23]。近年来，新兴经济体作为非传统援助者在解决全球粮食安全问题方面发挥了越来越重要的作用，预计会成为非洲农业国际合作的重要参与者[24]。

2014年在第23届非盟首脑会议上，非洲领导人共同签署《马拉博宣言》，重申 CAADP 的原则和价值观。除了重新确认 CAADP 的主要农业增长和支出目标外，《马拉博宣言》还在 CAADP 基础上扩大了目标范围，增加了以下七个方面的主题领域：重新承诺 CAADP 进程的原则和价值观；加强农业投资；到2025年结束非洲的饥饿；通过包容性农业增长和转型，到2025年将非洲的贫困减半；促进非洲内部农业贸易；加强对气候变化和其他风险的扛逆力；并承诺对行动和结果进行相互问责。为实现这些目标，《马拉博宣言》呼吁发展伙伴以协调一致的方式为宣言的实施提供技术和财政支持。

与此同时，非洲国家正在寻求建立新的发展援助关系，强调非洲的所有权，这是 NEPAD 自成立后所一直倡导的，并在之后的战略中得到重申。2015年非盟首脑会议通过的《2063年议程》倡导开展国际合作，促进和保障非洲的利益，同时坚持互利共赢，并与泛非愿景保持一致。该议程要求尊重非洲在国际合作中的观点和意愿，并对伙伴关系作出相应调整。

在这种背景下，以“平等、互利、共赢”为原则的中非农业现代化合作有着良好的基础和广阔的前景，中国有潜力在非洲的农业国际合作中发挥更大作用。

2. 中非农业合作的现状、机制和成效

2.1.中非农业合作现状

中国与非洲的农业合作始于1959年中国向几内亚政府无偿提供粮食援助[28]。在过去的50多年里，中国非洲农业合作不断深化，从最初的以无偿援助性质的合作逐渐延伸向农产品贸易和农业投资等各个方面，在基于赠款的援助的基础上，将投资和贸易相结合，打破了三者之间传统的边界，并涉及日益复杂的参与主体[29]。

过去几十年里，中国经济快速增长，农业发展的成就令人瞩目，中国的发展经验得到国际社会的广泛关注，非洲及其他发展中国家对学习中国农业发展经验表现出浓厚兴趣[28]。而自2000年中非合作论坛机制建立以来，中国也致力于在旧的纽带上建立合作的新伙伴关系，并加快了与非洲的农业合作，尤其是将农业和粮食问题放在重要位置[30]。2013年，中国政府发布了第二份《中国与非洲的经贸合作(2013)白皮书》，明确提出加强中非农业与粮食安全合作。2015年12月4日，中国国家主席习近平在中非合作论坛约翰内斯堡峰会开幕式上提出未来3年同非方重点实施的“十大合作计划”，并决定提供600亿美元资金支持，而“中非农业现代化合作计划”也被列为其中之一。

中国在过去几十年对非洲农业合作的方式也发生了一些变化，农业援助已经从大型国有农场转向支持非洲的小农，并且涉及农业基础设施建设，粮食生产，畜牧业、农业技术交流和转让，以及农产品的储存和运输等日益广泛的领域[31]。 中国还尝试了将援助和经济合作相结合的新方法，如合资企业，合作合同和公私合作伙伴关系等[32]。中国在农业对外开放方面积累了丰富经验，并具有农业技术、产品、人才优势，通过加强对非农业合作，对于帮助非洲国家提高农业生产技术水平、消除贫困可以起到积极作用。

2.1.1.中国对非洲的农业援助

长期以来，相对于经济合作与发展组织（OECD）成员国，中国对非洲农业方面的援助金额仍然较为有限，根据法国国际农业发展研究中心的一项研究[33]，从2009年至2013年中国对非洲的农业援助金额约为1.3亿美元（由农业示范中心的成本估算，不包括多边援助，特别是通过世界粮食计划署的援助），而 OECD 发展援助委员会（DAC）的双边和多边捐助者仅在2012年就为农业和农村发展承诺了30亿美元的援助。该研究还指出，中国对非洲60%的农业援助项目为赠款形式，其他40%为公共或私人贷款，而项目涉及的国家较为集中：西非的贝宁，加纳，马里和塞内加尔占约60%；南部非洲的津巴布韦，坦桑尼亚和莫桑比克约占40%[33]。

然而近年来，中国正日益成为非洲农业援助中更加重要的参与者。由于数据获取上的困难，目前尚难以做到以量化方式衡量中国对非洲农业援助的增长：一方面，缺乏官方发布的中国对非农业援助数据；另一方面，国际上对援外资金定义存在差异，例如经合组织国家发展援助委员会（OECD-DAC）统计的援助数据通常只包括官方发展援助（ODA）[34]，这与中国政府对援外资金的定义[1]有所不同[35]；此外，由于中非农业合作的特点，援助和贸易、投资之间的界限较为模糊，也为数据统计造成了困难[29]。

[1] 根据《中国的对外援助（2014）》白皮书的定义，对外援助资金包括无偿援助、无息贷款和优惠贷款三种方式。

虽然缺乏直接的中国对非洲农业援助数据，相关研究普遍认为，近年来在中非合作论坛的推动下，中国对非洲的农业援助呈现出快速增长的趋势，范围也不断扩大。首先，近年来，中国对非洲援助的整体规模迅速扩大。特别是加大了技术援助力度[36]。中国政府在农业领域的援助模式主要有以下几种[28]：一是援建农业技术合作项目。中国为受援国开展的一些基础设施建设和水利工程项目，积极促进了当地农业发展和民生改善。到2017年，已建成的160个农业援助项目包括农场35个、农业技术实验站和推广站52个、牧业项目11个、渔业项目15个、农田水利工程47个，帮助受援国开荒造田约5.55万公顷。二是加强农业发展的能力建设。近些年，中国为提升受援国农业生产力，与受援国开展农业领域人力资源合作开发，几十年间，为受援国在华培训了万余名农业技术专业人才。 三是农业专家对外派遣。在中非合作论坛框架下，中国政府向非洲派遣了104名高级农业专家、50多个农业技术组。四是建设农业技术示范中心，到2018年共建成农业技术示范中心19个，还有5个正在推进中。

2.1.2.中非农业贸易

2000年之前，中非农业贸易基本处于相对平稳状态，贸易额波动不大。2000年以来，随着中非合作论坛和中国加入世贸组织的推动，中非农产品贸易发展迅速，尤其是中国政府自2005年开始实行非洲国家部分输华商品零关税政策以来，非洲农产品对华出口迅速增长。根据中国海关数据，中国对非洲农产品贸易额在2001-2016年，从6.09亿美元增至54.11亿美元，年均增长率约为15.68%。其中，进口额增速较快，从2001年的1.87 亿美元增加到2016年的27.64 亿美元，在15年的时间里年均增长19.67%；出口额从4.22 亿美元增加到26.47 亿美元，年均增长约13.02%。

中非双方在农业生产的资源禀赋上具有很高的互补性，中国从非洲主要进口油料、纺织原料作物和烟草制品等农产品，而中国主要向非洲出口茶、调味香料和蔬菜、水果、坚果制品以及水、海产品等加工农产品。研究显示，近年来中非农产品贸易朝着体现双边比较优势的方向发展[37]。尽管中国的国有企业仍然在对非洲的进口中占据主导地位，但在对非洲出口方面，私营企业已经超过国有企业，成为新的主力[5]。

受到2011年以来非洲农产品贸易整体下滑趋势的影响，2014-2016年，中非农产品贸易额有所下降。根据粮农组织2016年的预测，受到各国贸易保护主义政策增加等因素的影响，未来十年世界农产品贸易增速会放缓，而作为非洲农产品的进口国之一，中国经济增速的放缓，也会对中非农产品贸易有较大影响[21]。

2.1.3. 中国在非洲的农业投资

中国在非洲的农业投资源于中国对非洲与农业有关的援助项目，如改善农业基础设施、资助农业研究或农场建设等[38]。长期以来，中国在农业方面的直接投资占中国对外直接投资总额的比重较小[5]。但是，自2006年中非合作论坛第三届部长级会议以来，中国也大幅增加了对非洲的农业直接投资。2009年，中国在非洲农业领域的直接投资额约为3000万美元[39]，而根据中国农业农村部对外经济合作中心（以下简称“外经中心”）的统计，到2015年，中国在非洲的农业投资流量为2.1亿美元。截至2015年底，中国对非农业投资存量达到10.3亿美元，在非洲投资成立农业企业达113家，分布于32个国家，雇用非洲当地员工3万多人，指导农民开展生产近20万人次，粮食作物总产量为39.7万吨，经济作物总产量为11万吨，为当地缴纳税金2000多万美元。

中国对非洲的农业投资主要集中在种植业，占中国对非农业投资存量的74%，而渔业占比为14.6%、农林牧渔服务业、林业、农副产品分别占8.9%、1.3%和0.3%（截至2014年底数据，外经中心）。近年来，中国在非洲的农业投资呈现出日益多元化的趋向[5]。农业投资由政府主导逐渐向市场主导转型，规模化、产业化、集群化正在形成，农产品贸易从一般商品贸易逐渐向产能合作和加工贸易升级，中国对非农业投资中私人投资者的参与也在逐渐增加[40]。

2.2.中非农业合作机制

中非农业合作机制在传统双边合作的良好基础上不断得到丰富，逐步建立起中非合作论坛的多边对话机制以及引入同国际组织、发达国家和民间非营利组织等第三方合作伙伴相互协作的三方合作机制。

2.2.1.不断扩大的双边合作

首先，中非双边合作不断深化，中国与非洲国家农业部门的高层交往日益频繁，先后有近百个非洲国家的高级代表团访华，中国农业部门领导人也多次访问非洲。通过高层互访，交流了农业发展经验，建立了合作机制，探讨了合作重点，为农业合作奠定了基础。截至2015年底，中国农业部已经与南非、埃及、埃塞俄比亚等18个非洲国家签署了33份农牧渔业合作协议，并与南非、埃及、苏丹、厄立特里亚、坦桑尼亚、莫桑比克、肯尼亚、赞比亚和纳米比亚等9个国家建立了农业工作组机制 [40]。另外，中国农业部还在非洲国家举办了一系列农业投资促进活动，并支持有关专家和企业参加中国驻非洲国家使领馆举办的各种农业投资研讨会，把中国企业带到了非洲，为中国企业深入了解非洲国家的需求和投资环境提供机会，搭建了中非企业面对面交流的平台。

2.2.2.中非合作论坛框架下的农业合作

2000年，在中非双方共同倡议下，中非合作论坛第一次部长级会议在北京召开，中非合作论坛正式成立，建立起中非多边集体对话的平台，推动了中非农业合作在各个层面工作的开展。论坛从成立之初就将农业作为中非合作的重大领域，经过历届论坛的不断努力，中非已经就农业合作达成共识，明确了具体的合作领域，将粮食安全作为合作的优先领域，并在农业技术交流和人力资源开发等方面进行了有益的尝试。在中非合作论坛的框架下提出的探索三方合作模式也取得了实质性进展，相继开展了粮农组织“粮食安全特别计划”框架下的农业合作及中英非三方农业合作。

近年来，中非合作论坛框架下的农业合作进一步得到深化。2010年，中共中央对外联络部与农业部在北京共同举办了中非农业合作论坛，与18个非洲国家的政府、政党领导人从战略高度就共同关心的问题如农业可持续发展、全球气候变化和防灾减灾等进行交流，并发表宣言，中国将支持非洲国家自主实施“非洲农业综合发展计划”。2015年中非合作论坛约翰内斯堡峰会上，习近平主席将“中非农业现代化合作计划”作为未来3年同非方重点实施的“十大合作计划”之一提上议程。中国承诺将同非洲分享农业发展经验，转让农业适用技术，鼓励中国企业在非洲开展大规模种植、畜牧养殖、粮食仓储和加工，增加当地就业和农民收入。中国将在非洲100个乡村实施“农业富民工程”，派遣30批农业专家组赴非洲，建立中非农业科研机构“10+10”合作机制。中国高度关注非洲多个国家受厄尔尼诺现象影响致粮食歉收的问题，将向受灾国家提供10亿元人民币紧急粮食援助[41]。2018年

中非合作论坛北京峰会上，习近平主席提出“支持非洲在2030年前基本实现粮食安全，同非洲一道制定并实施中非农业现代化合作规划和行动计划，实施50个农业援助项目，向非洲受灾国家提供10亿元人民币紧急人道主义粮食援助，向非洲派遣500名高级农业专家，培养青年农业科研领军人才和农民致富带头人[1]”。

为进一步推动中非农业的交流合作，中非农业合作研讨会从2013年开始在海南举办，到2017年12月已成功举办了四届，第四届研讨会上，中非双方及国际组织代表签署了8项合作协议，并就新时期如何深化中-非农业科技合作达成重要共识，确定了中非科技合作的重点问题和合作内容，并决定定期召开中非农业合作论坛（研讨会），建立中非农业科研机构“10+10”合作机制，推动落实2015年中非合作论坛约翰内斯堡峰会共识，深化在联合国粮食和农业组织、世界粮食计划署、国际农业发展基金会框架下的合作,充分发挥非盟的协调作用，推动中非农业科技合作的向前推进。

2.2.3.联合国机构框架下的三方“南南合作”

在联合国粮农组织（FAO）“粮食安全特别计划”的框架下，中非围绕粮食安全开展了一系列农业合作。此外，近年来中国也开始与世界粮食计划署（WFP）和国际农业发展基金（IFAD）通过三方“南南合作”的方式，对非洲开展农业培训项目。

“粮食安全特别计划”是联合国粮农组织为帮助低收入缺粮国家解决粮食安全问题而于1994年发起的一项重大倡议，并在此计划下推进农业领域的“南南合作”。中国农业部从1996年起，即开始与 FAO 合作在埃塞俄比亚开展农业“南南合作”，是参与时间最早、参与人数最多的国家之一。在中非合作论坛的促进下，2008年和2014年，中国政府先后两次宣布向联合国粮农组织捐赠共计8000万美金，专门用于支持开展“南南合作”。目前，中国已成为对 FAO“南南合作”出资最大、派出专家最多、成效最显著的国家。根据外经中心的统计，截至2018年5月，中国已经向刚果（金）、乌干达、纳米比亚、埃塞俄比亚、利比里亚、塞内加尔、尼日利亚、马里、塞拉利昂、马拉维、加蓬、加纳和马里塔尼亚等多个非洲国家派出了950余名专家和技术员，成功示范和推广了200多项农业实用技术，为提高当地的农业技术水平做出了积极贡献。

2.2.4.“南南北”三方合作

除了与国际组织的三方合作，中国在与非洲的农业合作中也尝试了与发达国家共同参与的“南南北”国际援助合作模式。2008年11月，中英两国农业部长在北京签署了《中英可持续农业合作谅解备忘录》，提出进一步加强两国在粮食安全、农业研究及中英非三方农业领域的合作与交流，为提高全球农业生产能力做出贡献，从而正式明确并启动了中英非三方农业合作。2012年，英国国际发展部（DFID）提供1千万英镑，支持在中英非三方合作下促进中国实用农业技术向非洲低收入国家转移的项目（AgriTT[2]）[42]。AgriTT 于2013年3月开始运行，到2017年已顺利完成了在乌干达开展的木薯试点和在马拉维开展的罗非鱼技术试点工作；同时，该项目还设立研究挑战基金（RCF），支持完成了11个联合研究项目。这种“南南北”三方合作的方式，发挥了中英非三方各自的特点和优势，将中方丰富的农业实用技术、英方作为发达国家的雄厚资金实力和非方发展农业的自然资源相结合，开拓出了可以有效整合资源的农业合作模式，为非洲带来更适用于其农业发展的技术和管理模式。

[1] 中国国家主席习近平在2018中非合作论坛北京峰会开幕式的主旨讲话，http://www.xinhuanet.com/world/focacsummit2018/fhkms/wzsl.htm。

[2] 项目全称为“中英非三方农业合作项目-合作伙伴关系加速农业技术转移”。

2.2.5.其他发展伙伴参与的三方合作

除了传统的国际组织框架下的三方合作和发达国家参与的“南南北”三方合作模式，中非在农业合作方面还积极尝试和探索了与其它第三方发展伙伴，尤其是民间非营利组织之间的合作。例如，比尔及梅琳达·盖茨基金会和国际农业研究磋商组织（CGIAR）、非洲水稻中心及其在中国和非洲各成员国的合作伙伴正积极建立三方合作伙伴关系，期望通过与中国农业科研机构、在非洲的中国农业技术示范中心、中国派驻非洲的农业技术专家组合作，引进、吸收与利用中国的杂交稻技术、旱稻技术、再生稻技术、常规水稻及各种抗逆稻技术，并充分利用非洲水稻中心现有技术和平台，在十二个非洲主要产稻国（尼日利亚、塞内加尔、塞拉利昂、马达加斯加、埃塞俄比亚、坦桑尼亚、莫桑比克、科特迪瓦、马里、乌干达、布基纳法索、利比里亚）进行品种选育与改良、试验、示范与推广，逐步改善当地的水稻生产水平，不断提高水稻产量，提高非洲水稻自给率，加强非洲农民尤其是小农抵御极端天气、干旱、洪涝等灾害的能力。该项目的实施，将有助于非洲消除贫困 、消除饥饿和实现粮食安全等目标，加快非洲农业转型的步伐[43]。

2.3.中非农业合作的重点与成果

在中非合作论坛的推动下，中国政府通过援建农业技术示范中心，派遣高级农业专家和农业技术人员，传授和推广农业生产管理经验和实用技术等方式，帮助非洲提高农业自主发展能力，取得了显著的成果。

2.3.1.农业技术交流和培训

非洲国家积极寻求与中国开展农业技术交流和培训方面的合作。2001年中国农业部与埃塞俄比亚农业部签订了“关于在农业职业技术教育培训和绿色证书领域进行合作的意向书”，双方开始加强农业职业教育培训的合作，由埃塞政府提供主要资助款项和选拔教师赴埃塞承担农业职业教育授课任务，中国农业部负责组织教师派遣[44]。“自2001年，中国政府已与埃塞俄比亚政府合作实施了共十多期农业职业技术教育培训项目，累计派出300多人次教师赴埃执教，共讲授作物栽培、畜牧、畜医、农机、家政、自然资源开发等6个专业的48门课程，受教学生近7万人，并帮助埃塞建立了较完善的农业职业技术教育体系[28]。”

而中国政府也十分重视开展与非洲的双边农业技术交流与合作，并通过商务部援外资金、外交部资金、财政部资金，FAO、WFP 等国际组织资金积极为开展对非能力建设培训工作提供资金支持。2006年以来，中国农业部在华举办培训班260期，累计为非洲54个国家培训农业官员和技术人员4980人次[45]。2015年12月以来，为配合落实中非论坛峰会上宣布的一系列措施，加强对非洲的能力建设，中国专门安排了农业国际合作交流专项资金对重点合作的非洲国家开展了农业政策和技术培训，还在双边援外框架下向非洲派出了多个援非农业技术组、农业职教组和数百名农业技术专家、职教教师，提供政策咨询，传授实用技术，开展实用培训、试验示范、理论教学。根据外经中心的统计，2016年农业部在非洲地区开展了49期培训项目，总共培训人数达939人，其中短期来华培训836人，境外培训85人，硕士项目18人，农业国际合作交流专项培训39人，FAO“南南合作”项目下培训38人，通过中国-WFP“南南合作”培训16人。

2.3.2. 农业技术示范中心

2006年中非合作论坛北京峰会以来，应非洲国家的要求[46]，中国开始在非洲援建农业技术示范中心，这是一种将援助和商业相结合的创新性农业合作模式[44]。不同文献和报道中关于已建成示范中心的数目略有出入，根据外经中心提供的最新数据，目前中国已经在卢旺达、莫桑比克、苏丹等非洲国家建成19个农业技术示范中心，还有5个农业技术示范中心也在陆续推进，多个农业技术合作项目在实施当中。

目前农业技术示范中心的成效尚未得到系统的总结，尤其缺乏第三方的独立评估，但已经展现出一些初步的成效。中国在塞拉利昂、坦桑尼亚和马达加斯等国实施的水稻种植示范项目，示范的水稻均比当地品种实现单产的显著提高，在中国专家的培训和指导下，当地技术人员和农民已经初步掌握了中国杂交稻高产栽培技术。通过试验研究、技术培训和示范推广工作，援建的农业技术示范中心在非洲示范推广了大量先进实用的中国农业技术，培养了大批农业管理人员、技术人员和当地农民，筛选了一批适合非洲当地环境的农牧品种，提升了受援国在所示范领域的农业技术水平，并通过投资开发对促进非洲农业产业的发展起到了促进作用，为受援国农业农村经济发展起到了积极作用。表1展示了已建成援非农业技术示范中心的情况。

表1. 已建成援非农业技术示范中心建设情况

国别	实施单位	进展情况
莫桑比克	湖北农垦集团	进入商业运营阶段
苏丹	山东外经集团	进入商业运营阶段
利比里亚	湖南隆平高科公司	进入商业运营阶段
贝宁	中国农业发展集团	进入商业运营阶段
坦桑尼亚	重庆中一种业公司	进入商业运营阶段
卢旺达	福建农林大学	进入商业运营阶段
刚果（布）	中国热带农业科学院	进入商业运营阶段
津巴布韦	中机美诺公司	进入商业运营阶段
乌干达	四川华侨凤凰集团	进入商业运营阶段
多哥	江西华昌国际公司	进入商业运营阶段
埃塞俄比亚	广西八桂公司/辽宁国际	进入商业运营阶段
马拉维	青岛瑞昌棉业	进入商业运营阶段
喀麦隆	陕西海外投资公司	进入技术合作阶段
赞比亚	吉林农业大学	进入技术合作阶段
刚果（金）	中兴能源有限公司	进入技术合作阶段
毛里塔尼亚	宁夏金福来羊公司	进入技术合作阶段
毛里塔尼亚	黑龙江燕林科技公司	进入技术合作阶段
赤道几内亚	江西赣粮实业公司	进入技术合作阶段
安哥拉	新疆建设兵团	进入建设期

资料来源：中国农业农村部对外经济合作中心，2018

3. 中非农业现代化合作面临的挑战

经过数十年的努力，中非在农业合作方面取得了一系列的成果。然而当前中非农业合作的实践中还存在一些问题，结合与中非农业合作相关参与部门和研究人员的访谈，可以总结出当前在中非农业现代化合作中主要面临以下几方面的挑战。

3.1. 缺乏综合战略规划和统筹协调

长期以来，中非农业合作以中国农业部与非洲国家在双边合作基础上开展的项目为主，但合作项目规模小、较为分散，缺乏一个综合战略规划的指导。2015年，习近平主席将“中非农业现代化合作计划”提上议程，但是目前尚未形成配套的具体战略和行动计划。缺乏整体战略规划的指导，就难以合理设计中非合作项目、协调参与机构和有效分配援助资源，导致农业援助和农业合作不成体系，存在碎片化问题。

一方面，参与农业援助和合作的机构数量和项目类型日益庞大，不同机构及其合作项目在目标和内容上存在着交叉性和重复性，造成资源浪费和内部协调的困难。虽然中国对外援助有高层协调机制，但对于多边机构的援助、双边国别援助以及不同部门的援助，还有财政援助、物资技术援助和经济援助等均由不同部门掌握，对外援助呈现出碎片化的现状。另一方面，缺乏对重点地区和重点领域投入的侧重，往往稀释了农业合作的资源，难以在某一方面实现真正突破，从而达到通过农业合作帮助非洲国家有效摆脱发展困境的目标。此外，当前中非农业合作以国家层面的双边合作为主，主要基于中国与非洲国家分别签署的农业合作协议，而缺乏地区层面的合作。

3.2. 合作停留在技术层面，缺乏政策、制度和社区经验分享

当前中非农业合作以技术交流合作为主，技术示范中心、人员交流、培训，都是中国在农业技术援助方面比较创新和具有相对优势的方面，但是这些农业合作项目较为局限在技术层面，对技术扩散的社会文化因素没有纳入充分考量，尤其是缺少对非洲社区发展议题的关注。

非洲国家除了在对农业投资、技术合作的需求，也需要在政策、制度和社区发展等更广泛的层面与国际合作者开展经验交流。中非在农业发展相关制度和政策层面的不同会影响到中非农业技术合作的效果。例如，中国农业生产技术的进步离不开中国政府主导下农业基础设施的快速发展，而中国农业技术在非洲的推广，要面临当地农业基础设施投入不足带来的困难[48]。因此，通过制度和政策层面的经验交流,促进非洲农业发展相关制度和政策环境的改善，是农业合作深入推进的重要保障。然而中国在对自身农业和经济发展的政策经验方面缺乏系统性的总结，也没有开展足够的研究，找出那些中国成功经验适合在非洲进行推广，而非洲则缺乏知识分享的平台和途径，目前中非在农业发展方面开展的政策对话相对不足，缺少制度经验的系统性分享。

3.3. 以政府为主的单一沟通和合作渠道

中国机构在赴非参与农业合作和援助项目的过程中，习惯于借助于以当地政府为主的沟通渠道，但是与当地居民、社区、社会团体的接触较少，缺乏社区发展对话，并且未能建立起与其它双边发展援助机构的协作。

首先，缺乏与当地社区和民间社会组织的对话系统。当地精英和社会团体作为政府与民众之间的纽带，在非洲经济社会层面发挥着重要作用。中国的机构和企业与当地精英和社会团体的互动和协作比较有限，如果不能充分利用这一渠道，了解非洲当地的诉求，加深与当地社会的联系，有可能在项目开展过程中因缺乏沟通而造成误解，受到来自当地社会组织的批评和阻力[49]。而缺乏与其它第三方机构的合作，尤其是未能引入第三方对项目相关影响的评估机制，也容易在舆论上陷入孤立无援的状态。

中非农业合作项目往往以中方为主导，缺少非洲当地私人企业的参与和与其它双边援助机构的合作。中非之间的农业合作，大部分还不能称为完全意义上的“互利共赢”式的合作，中国单方面援助意义上的合作占据较大比例，因此项目设计由中方主导，在合作项目后续的实施中，由于当地参与主体对合作项目缺乏必要了解和参与的自主性，会对农业合作项目的深入开展形成制约。另一方面，中国企业赴非洲投资的农业项目，更倾向于选择与中国分包商合作，而不是与当地私人企业合作，或者培训和利用当地劳动力[49]。当地私人企业参与度不足，中非农业合作项目就难以在更深层次带动非洲国家农业和经济发展的内生性力量，对其经济社会发展产生更加深远和持续性的作用。

2015年以来，为支持其他发展中国家落实2030年可持续发展议程所设定的各项目标，中国政府设立了对外援助性质的“南南合作援助基金”。南南基金运行过程中，鼓励根据需要在中国及受援国社会组织、国内外智库及国际组织等相关各方之间开展多边合作与三方合作，包括共同设立相关援助领域的子基金，以及探讨公私合营模式的援外合作。该基金的设立，为中非农业三方合作提供了新的机制和方式，但是这种方式下的合作也存在一些局限性，例如对项目资金的限制使得该基金支持下的项目规模较小，相对分散。

3.4. 缺乏需求导向，项目可持续性不足

面对非洲各国农业发展条件和诉求的差异性，中非农业合作的实践中往往存在对非洲当地实际需求不能准确把握的问题，并缺乏与非洲自身农业发展政策之间的配合，会造成中国对非洲的农业援助和农业合作项目效果大打折扣。

首先，当前的中非农业合作缺乏与非洲自身农业发展计划和政策的对接。2003年非盟峰会通过了“非洲农业综合发展计划”（CAADP），积极倡导在农业基础设施与农产品流通设施、扶持小农与救灾及紧急粮食援助、农业科研与推广等方面开展国际合作，帮助非洲发展农业。目前，已有近40个非洲国家制定了具体的国别发展战略。中国在推动中非农业合作的过程中，没有将在农业方面投入的资源与 CAADP 和非洲各国的国家农业投资计划有效对接。虽然近年来中国开始逐渐认识到支持非洲的“农业综合发展计划”的必要性，但是目前还没有找到合适的切入点，尚未进行实质性的参与。而如何通过对非洲的农业援助带动非洲自身农业公共投入的增加，对中非农业合作构成了很大的挑战。

找到一个有效的机制来与各国对接，并支持其国家投资计划（NAIPs）的实施，这样做有几点优势：首先，NAIPs 明确定义了各国的优先事项和目标，这些优先事项和目标可以直接得到中国的支持，或者可以作为设计和实施新的独立项目的指导方针；其次，

国家投资促进机构还为中国和其他发展伙伴的投资提供互补和协调的机会；最后，围绕国家行动方案的参与也为加入非洲各国的国家对话和审查进程提供了机会，可以提高中国与各国伙伴关系的质量。

另一方面，非洲国家发展农业的自然禀赋差异很大，各国对于农业发展的需求和优先序也各不相同，非洲国家日益认识到在农业合作中提升农业价值链和创造就业的需要，中国赴非机构、企业和人员事先对当地政策和市场、社会需求了解不充足，可能导致预先设计的项目目标不能顺利实现[48]。而中非农业技术交流项目和其他合作项目能否适应非洲不同国家农业发展的客观条件，满足非洲国家的实际需求，也在很大程度上影响着着中非农业合作的成效，这对中国对非的农业合作和援助工作提出了挑战。

此外，在非洲特殊的政策、市场和制度环境下，中非农业合作项目的可持续性也面临挑战。例如中国在非洲建设农业技术示范中心的实践，虽然借鉴了中非农业技术转移的早期经验，在做法上进行了改进和有益的尝试，但是仍然较为依赖中国政府提供的资金支持，在资助期满之后，由于缺乏资金和当地政策的支持，往往难以在企业的参与下转入有效的商业运营，未能实现可持续的发展。

3.5. 人员交流存在语言、文化障碍和能力欠缺

由于以往中国缺乏专门的海外援助管理机构，发展援助行业的职业化程度较低，派驻人员的选拔和培训主要依赖于援助项目的承建机构开展，不能满足援非实践的需要。一方面，中国派驻非洲参与农业合作项目的人员缺乏对外援助管理经验，对当地社会文化、政策法规了解不充分，而非洲一些国家复杂的经济社会状况对于中国派驻非洲人员处理与当地社区和工会关系的能力构成考验；另一方面，受制于派驻人员教育背景的限制，相当一部分中方人员与非洲当地合作者、员工、当地居民的沟通还存在语言障碍。要克服语言、文化障碍和能力欠缺等中非人员在合作中面临的客观挑战，需要中非双方充分借助在农业交流和培训方面的成果，尤其是积极鼓励非洲留学生参与到中非农业现代化合作中，发挥其了解双方语言、文化的优势和所掌握的专业技能，为促进中非农业现代化合作贡献力量。

3.6. 国际舆论环境的挑战

国际社会对于中非合作以及中国在非洲的农业参与十分关注[44]。长期以来，部分媒体渲染中国在非洲的新“殖民主义”，对于中国在非洲的农业投资，也有媒体将之描述为“新圈地运动”[50]，认为中国在面临人口增长、耕地减少和粮食安全的巨大压力下，将目光投向非洲的农业资源。虽然国际上一些学者的研究结果显示，对中国在非洲“圈地”的指责并不符合事实[51]，但是这些负面报道仍然对中非农业合作造成了巨大的舆论压力。

此外，非洲当地社会和媒体也存在对中国在非洲农业项目负面影响的担忧，在一些极端情况下，项目所在非洲国家的不同党派在博弈的过程中会借助媒体对中国投资和援建项目的环境负面影响、土地剥夺和侵犯劳工权益等问题进行夸大，引发民众的反对情绪，使得中非合作项目成为当地政治扯皮的牺牲品[52]。

目前中国媒体对中非农业合作的宣传以面向国内为主，缺少对争议问题讨论的参与和关注。在相关的国际舆论中缺少中国的声音，更缺乏第三方中立机构的声音，不利于为中非农业现代化合作营造良好的舆论环境。

4. 新征程：中非农业现代化合作规划和行动计划的制定

中非农业现代化合作符合双方的需求和利益。一方面，非洲农业发展需要国际援助的支持；另一方面，国际农业合作也符合中国的战略需求。近年来，逆全球化浪潮涌现，贸易保护主义抬头，为世界农产品贸易带来更多不确定性，对中国和非洲的粮食安全及农业发展提出了挑战[25]，中国需要寻求更加多元化的农业合作伙伴，在贸易冲突加剧的背景下保证自身的粮食安全。2013年，中国提出共建“丝绸之路经济带”和“21世纪海上丝绸之路”（以下简称“一带一路”）的重大倡议，在该倡议下，农业国际合作成为沿线国家共建利益共同体和命运共同体的最佳结合点之一。非洲是“一带一路”建设的关键伙伴，同时具有发展农业的巨大潜力。世界银行的报告显示，非洲是拥有可耕种土地面积最大的地区[26]，据估计，非洲大约9.3亿公顷的土地在生物物理条件上适宜农业生产[27]，但只有较少比例用于生产粮食。如果通过中非农业现代化合作能更好地实现非洲的农业潜力，不仅有助于解决非洲的界问题，而且对于改善全球粮食安全都有着重要意义。

2015年习近平主席提出中非十大合作计划，为中国和非洲带来农业合作的新机遇。2018年中国又进行了新一轮机构改革，其中也包括对外援助架构的改革，这成为调整和优化对外合作和对外援助工作的新契机。在机构改革之后，需要将分散在各个部门的对外援助职责进行整合，加强中非农业现代化合作的战略谋划和统筹协调，对农业援助工作进行统一管理，并合理发挥新成立的国家国际发展合作署的作用，推动农业援助工作的系统性优化。

为了在新时期发挥中非农业现代化合作的潜力，有必要制定科学的综合战略规划以指导中非农业现代化合作的未来发展。2018年中非合作论坛北京峰会上，习近平主席提出同非洲一道制定并实施中非农业现代化合作规划和行动计划，此规划可在未来几年内指导、协调中国在非投资和合作活动，确保其与非洲联盟成员国的重点开发工作相契合。因此，需要将中国的农业发展援助计划与非洲自身的农业发展计划和政策结合起来，加强对 CAADP 和非盟《2063议程》的支持。此外，该规划需要推动中非合作的深入开展，针对上述中非农业合作中面临的主要挑战提出有效的应对措施。为了制定有效的规划，需要考虑以下因素。

4.1.加强战略规划和统筹协调

首先，深入推进中非农业现代化合作，需要加强战略规划和统筹协调，制定出科学的综合战略规划以指导未来中非农业现代化合作的开展，完善中非农业合作的对话机制，加强部门之间的协调和合作。

其次，丰富和深化合作层次，在规划制定中纳入至少三个层面的合作：大陆层面，区域层面和国家层面。在大陆层面，需要与非洲联盟达成协议，与非洲农业综合发展计划（CAADP）有机对接，以获得指导和协调支持;在区域层面，根据自然禀赋、农业发展需求、所面临的挑战和政策环境等条件的相似性等因素，将非洲划分区域，并充分发挥区域经济共同体在促进农业合作方面的作用；大多数中非农业合作项目的设计将主要在国家层面开展，因此需要考虑到非洲各国农业发展处于不同阶段而存在需求差异，并与各国的国家农业投资计划（NAIPs）相对接。中国与非洲国家的农业合作需要通过梳理这三个层面的合作来实现系统化。

此外，还需要建立和完善中非农业合作的对话平台，建立起中非农业合作论坛的长效对话机制，促进农业合作各方面工作的开展。

4.2. 同 CAADP 和非洲《2063年议程》有机对接

中非农业现代化合作要立足非洲农业发展实际需求，为此需要加强与非洲在农业方面的政策对话，注重对现有中非农业合作项目的总结，找出与实际需求存在的差距，定位出适合非洲农业发展的项目和重点领域。中国促进非洲农业现代化的目标，完全符合非洲领导人加快农业增长和农业转型的意愿，而其关键在于确保中国参与发展合作的具体投资实践符合非洲国家的需求、条件、计划和优先事项。

非洲联盟实施2017-2021年“CAADP-马拉博宣言”的商业计划[53]是使相关发展合作与非洲需求保持一致的一个切入点。该商业计划为实现 CAADP 和马拉博宣言的承诺提供了行动框架，并指导国际发展援助与非洲的优先事项保持一致。它是围绕与七个马拉博主题领域相对应的七个战略方案和36个支持实现每个战略方案目标的子方案来进行安排的。该计划包括：

i）加强 CAADP 在国家和区域层面的执行系统：该项目旨在通过关于加强农业部门政策规划的四个子项目，打造国家和区域层面实施 CAADP 的能力；改善农业部门组织；加强协调和问责机制；与私营部门、农民组织和其他行动者建立更广泛的伙伴关系。

ii）扩大公共和私人投资：通过该计划，非盟支持各国通过子项目增加农业投资，以改善政策和监管框架，从而鼓励私人投资；提高公共支出的水平和质量；增加外国农业投资；确保农业投资的融资可获得性；加强公私伙伴关系和对话。

iii）提高农业生产力，加强营养和食物安全：该计划旨在支持各国实现马拉博宣言的目标，即将农业生产力提高一倍，将收获后损失减半，并在2025年之前将儿童发育迟缓减少到10％，体重过轻减少到5％。目标将通过子项目实现，以增加农业投入和机械化的可获得性；改善收获后管理；扩大本土学校的喂养和营养计划；推广主食的生物强化；加强粮食和营养知识管理与协调；加强社会保护计划。

iv）包容、可持续的农业生产以及加速农业增长：与计划3相关，该计划将有助于实现保持6％的农业年增长率的马拉博宣言目标；将贫困减少一半，通过包容性农业增长实现至少50％的减贫；并使生产力翻倍。子项目包括可持续的土地管理和治理；改善灌溉和水资源管理；改善动物资源开发；促进技术的产生，传播和应用；扩大妇女和青年的农业创业机会；竞争性价值链和农业产业发展。

v）实现扩大和有竞争力的非洲内部农业贸易：该计划的目标是支持各国和各地区实现马拉博目标，到2025年实现非洲内部农业贸易增长两倍。子项目包括政策和贸易体制协调；改善食品安全标准及标准的执行；改善市场基础；扩展农业增长区或农业走廊；加强贸易谈判能力。

vi）加强应对气候变化的抗逆力，改进风险管理：该计划旨在通过子项目提高农业生产者和整个部门的扛逆力，以改进气候的早期预警和应对系统；主流气候变化和风险管理方法；加强气候变化谈判能力；改善自然资源管理；加强减灾和灾害风险管理。

vii）加强大陆层面的协调、伙伴关系和相互问责以实现战略性成果：该计划旨在通过子项目支持马拉博宣言对行动和结果进行相互问责的承诺，以改进战略知识管理和扩大规模；加强战略沟通和宣传；加强国家、区域和大陆各级的协调；改进大陆层面的问责制、两年期审查以及监测、评价和报告制度；加强对 CAADP 实施的领导和政治参与。

通过实施相关政策和投资以实现 CAADP 和马拉博目标，最终是非洲国家的责任；在非盟商业计划的指导下，非盟向各国和区域经济共同体提供领导和服务，促使其更好地落实必要的行动。非盟的援助包括制定和分享战略框架、工具和好的实践经验；提供能力建设；协助战略执行；为各国和区域经济共同体之间提供分享经验教训的机会。

非盟的商业计划明确指出了非洲发展合作的优先事项，以实现“马拉博宣言”中概述的农业转型目标。商业计划的七个方案也对应于实现非洲共同发展目标所需的国家和区域投资领域。

通过了解非洲的需求和其自身的农业发展计划，可以更容易地确定中非农业现代化合作的旗舰项目。应当定位出具体的地点和价值链，在此基础上确定农业现代化的潜在旗舰项目和未来中国在非洲的发展合作的重点。在设计旗舰项目时，还应考虑到当地小农的利益和需求。

4.3.立足当地需求，确定中非农业现代化合作的重点投资领域

确定中非农业发展合作的具体投资领域必须经历一个科学的论证过程，包括确定国家或地区层面的优先事项，以及分析中国经验和优势技术的适用性。中国投资的选择可以包括提供资金或技术援助以支持非盟商业计划的子项目或非洲各国国家农业投资计划的要素。这些可行选项的优势在于可以确保与非洲的优先事项和当地的发展策略保持一致。

对于南部非洲，主粮作物对农业的增长贡献了相当大的比例，重要的是提高粮食产量和生产率以减少进口需求，降低价格，使农村和城市地区的消费者受益，特别是考虑到人口增长导致大米需求的迅速增加。产出增加必须与中游价值链细分市场的投资相结合，包括加工和储存，以及与饲料和生物燃料行业的联系。在中等收入国家（特别是博茨瓦纳，南非，纳米比亚和斯威士兰），牲畜养殖部门的投资也很关键。在这一组国家中，家畜占农业部门增长的24％。而随着收入的增加，这个行业将继续面临日益增长的需求。由于该地区混合作物生产的重要性，高粱和小米等作物也可能作为优先考虑的投资领域（特别是在安哥拉，博茨瓦纳，赞比亚，津巴布韦和纳米比亚的半干旱农业区）。改善灌溉及其他水管理技术和肥料分配系统运作的投资也非常重要，可以作为其他改善农业生产方式的补充 [54]。

在中非和东非，国际食物政策研究所（IFPRI）的动态研究管理评估（DREAM）建模软件进行的模拟表明，加大对少数几个国家的农业研发投资将对该地区产生广泛影响。特别是提高玉米、高粱、咖啡和牛肉生产力的技术可以产生显着的共享效益[55]。

基于非洲对水稻日益增长的需求，中非在水稻育种方面的合作潜力巨大，中国杂交水稻技术在非洲的推广可能成为未来中非农业现代化合作的一个亮点。作为许多非洲国家的一个明显趋势，人口和城市化的增长带来了稻米需求的激增，大米已逐渐成为许多非洲城市居民的主食。然而，由于非洲国家水稻育种和种植技术的落后，目前非洲的水稻产量很低，远远不能满足其不断增长的市场需求。选择高产品种有望成为改善非洲水稻生产的重要途径。另一方面，中国在水稻育种方面具有优势，中国杂交水稻的产量已经在非洲一些国家的品种比较试验中成功地进行了实验，显示了中国杂交水稻在改善非洲粮食安全方面的巨大潜力。在2009年举行的西非农业投资研讨会上，非洲农业专家建议推广中国杂交水稻技术，以增加水稻产量并确保粮食安全。在2010年8月举行的中非农业合作论坛上，非洲国家代表表示，需要中国继续在非洲转让农业技术。结合对水稻

产量的需求，增加非洲与中国杂交水稻的技术优势，是加强中非在水稻育种技术，筛选和推广适合非洲生长条件的水稻品种方面合作的有效途径。IFPRI 最新的一项研究表明，如果对中国杂交水稻的采纳率达到20%和50%，并加强农田水利灌溉建设，撒哈拉以南非洲有可能分别在2036和2030年实现水稻自给甚至净出口，且贸易顺差将持续扩大[56]。

非洲对与在特定场地进行集约化农业投资的兴趣日益浓厚，一些国家正在实施或规划农业产业园区，包括刚果民主共和国、塞内加尔和埃塞俄比亚。鉴于非洲的利益与中国的经验和专业知识的重叠，在尊重当地需求的基础上，中非农业产业园区建设也有可能成为中非农业现代化合作的旗舰项目。发展现代农业产业园区是中国推进农业供给侧改革，加快中国农业现代化的重要途径[57]。而作为中非产能合作的载体，共建产业园又代表着中非经济合作发展的新趋势。推进中非农业产业园区建设，可以将中非农业合作从技术层面推进到产业合作层面，也有利于促进非洲农业产业化。当前中国在乌干达、坦桑尼亚和多哥等非洲国家都积极尝试了农业产业园区的建设，但尚未收到显著成效。一方面是由于中非农业合作产业园区建设时间还较短，尚未进行大规模系统的实践；另一方面，当前国内对农业产业园的研究比较薄弱，缺乏体系化的规划设计、理论方法的指导和影响评价。这成为中国在境外，包括在非洲建设农业产业园区的制约因素。虽然存在一些障碍，但是，农业合作产业园区在当前的实践中也显示出了良好的发展潜力，对于发挥中非双方的比较优势、丰富当地经济类型、延长农业产业链条以及活跃投资和经贸能够起到积极作用。未来，在积极推进中非农业产业园区建设的同时，还需要加强理论、方法的研究和系统规划，根据非洲国家的农业发展特点和需求，合理定位产业方向，因为像电力这样的基础设施可能是工业园区成功运营的基本先决条件。根据非洲农业发展的特点和需求提供市场准入、关税等方面的政策支持也十分重要。与此同时，农业产业园区的运作应该融入社区的概念，与当地居民和当地社区建立更紧密的联系。最后，需要做好项目影响评价工作，评估项目的有效性。在此基础上，要做好经验总结工作，总结好的做法，汲取教训，充分发挥农业产业园区的示范和辐射作用，带动地区农业产业发展。

4.4.做好中国发展经验总结和分享

中国是一个传统农业社会，积累了丰富的农业知识和经验。而作为最大的发展中国家，中国面临着与非洲相同的经济、技术、安全及社会挑战[59]。中国在这种条件下成功地进行了经济体制改革，并在经济增长和减贫方面取得显著成果，完成了从粮食受援国到粮食捐赠国的转变。中国农业优先发展战略带来的亲贫式经济增长经验对非洲国家非常具有借鉴意义，非洲国家也对学习中国经验表现出极大的兴趣和积极性。中国经验作为国际发展中区别于西方发展模式之外的可行选项日益得到国际社会的认可。

然而，中国经验目前尚未在非洲得到充分的分享和推广，这在很大程度上是由于中国对非洲可以借鉴的、有用的农业和农村发展的经验缺乏系统地总结和分析。因此，在未来的中非农业现代化合作工作中，非常重要的一个方面就是要注重总结和提炼中国农业农村发展，尤其是农业现代化方面的成功经验。中国整体经济和社会转型离不开农业增长、农业农村转型和政策转型的有序实现。这在不同的区域农业生态条件下得以实现，离不开多方的协调努力、逐步的政策改革和投资的推动。中国、非洲和国际研究机构的研究人员以及非洲国家政策制定者需要理清并密切关注以下几个方面的经验教训，包括：为农民提供市场激励、农业技术和基础设施投资，有效促进当地农业增长和转型，以及有序进行制度和政策改革等。非洲正在经历快速的经济发展，因此指导其取得成功的发

展战略可能与以往尝试过的经验并不相同。考虑到非洲与中国地区农业生态特征和发展阶段之间的相似点和不同，我们还需要确定非洲与中国之间的差距、相似的发展潜力以及中国经验教训的适用性。

另一方面，中国缺乏有效的、易被非洲国家接受的知识分享方式，而非洲国家缺乏知识共享平台及渠道，这不利于中国经验的传播。这对这一点，需要加强对相关研究的支持，在实证研究的基础上筛选出适用于非洲农业发展实际的措施，为非洲的农业发展决策提供借鉴和启发。要在技术合作的基础上丰富中非农业合作的内容，加强中非在农业政策方面的对话和政策、制度经验的分享，在未来的农业合作项目中也要更加体现对非洲社区发展问题的关注。而创新经验分享和交流方式也是一个重要方面，有助于促进中国经验准确、有效地传播到非洲。

4.5.改善商业运营，提高可持续性

以往中非农业合作的实践缺乏可持续性已成为深化合作、促进非洲发展的主要瓶颈。比如，中非农业技术示范中心在政府资助期结束后很难实现成功的商业运营。虽然非洲在政策、市场和制度环境方面的不完善为项目的运营增加了挑战性，但仍然可以通过吸取经验教训，并采取相应的措施，改善中非农业合作项目的可持续性。首先，应加强私营部门的参与。在以往的农业合作实践中，特别是在援助和投资方面，政府和国有企业通常发挥着主导作用，私营部门的参与相对不足。国有企业在业务机制方面缺乏灵活性，制约了与当地市场联系。应该将私营企业有机的纳入商业运营，特别应关注已经在非洲成功开展经营业务的企业，使之在技术转移和推广方面发挥更重要的作用。私营部门对农业的投资增加将有助于提高技术援助的可持续性，私营企业的参与也可以通过向当地小农户提供农业合同或就业机会使当地小农户受益。同时，政府部门应凸显其服务职能，为企业的参与提供必要支持，包括建立信息和知识共享平台，提供公共产品和服务以及秩序保证。

4.6.加强与国际组织、双边机构和非营利组织的三方合作

当前的中非农业合作仍然以双边合作为主，但是多年来在粮农组织框架下开展“南南合作”的经验及中国-比尔及梅琳达·盖茨基金会-非洲项目、中国-国际农业研究磋商组织（CGIAR）-非洲项目、中英非农业技术转移项目的尝试显示了三方合作模式的潜力和优势。三方合作有利于整合多方资源，有效促进与国际组织和发达国家的知识和经验分享，提高援助资源的利用效率，这也是推动中国援助机构不断完善和提升能力的一个有效途径。从中国方面来看，制定出台三方合作相应的政策以指导未来中非农业三方合作的实践就显得尤为必要。在管理上，目前多个部委参与到三方合作中，各方面协调沟通不够畅通，也给合作国造成一定的混淆。对外合作的主管部门宜在合适的时机制定出台关于三方合作的明确的政策性文件，首先需要明确对三方合作的态度、立场和顶层设计，引导各部门有序开展三方合作工作。其次需要明确发展方向、合作对象、开展领域、项目管理程序及资金支持等，使今后的三方合作项目开展有据可依，路径清晰。

随着“南南合作”成为全球援助议程的一部分，传统援助捐助者、新兴援助捐助者和援助接受国之间的三方合作是未来发展的途径[24]。除了引入 UNDP、WFP、FAO、CGIAR、非盟、非洲开发银行等国际组织以及传统发达国家的参与，中国和非洲在农业

合作中还应积极拓展与南南国家、其他双边发展援助机构和民间非营利组织的三方合作，从而借鉴南南合作国在相似发展阶段的理念和实践经验、借助各方面的国际资源，将中非农业现代化合作的成效最大化。在未来的合作中，可以建立新的伙伴关系，以支持更好地实施中国的援助计划来促进非洲农业现代化建设。中国合作机构的参与使我们更容易吸取中国将农业转化为现代生产部门的经验，改善农村生计；这种三方合作的方式也将受益于当地合作伙伴在非洲的召集力；而其他第三方合作伙伴的参与将带来经验、专业知识和其他方面的资源，帮助促进中国对非洲援助资金利用效率的提高，创造更多切实有效的中非农业现代化合作项目，进而促进非洲农业现代化和农村发展。

4.7.做好第三方评估、影响研究和发展传播

中非农业现代化合作除了要做好合作项目的落实，还要做好评估、研究和传播工作。首先，需要鼓励中国学者参与到中非农业合作的相关研究当中，尤其是加强对中非农业合作现有项目的影响研究，为传播和应对国际舆情提供客观、可靠的依据，在客观研究结果的基础上才能对不实的负面舆论报道进行有效回应，减少其带来的负面影响[58]。

另一方面，要鼓励国际社会，尤其是第三方国际组织和民间社会组织的参与，做好第三方对中非农业合作项目环境影响等方面的评估，确保项目的土地使用实践符合国家环境和土地使用准则以及生态和可持续土地使用的国际标准，避免因为该方面问题导致不利的社会舆论环境。

此外，中国媒体要发挥在传播中的作用，通过发展中国媒体机构的国际部门，鼓励更多中国媒体在海外发声，并加强与第三方机构的合作，客观公正、有依有据地讲好中非农业合作的故事。在发展海外机构方面，新华社和中国中央电视台走在中国媒体的前列，但是这两家媒体一般被打上“官媒”的标签，在一定程度上影响其在海外的传播作用，因此要鼓励更多非官方、多元化背景的媒体走出去。

5. 结论

非洲是世界上饥饿和贫困问题较为突出的地区，同时拥有发展农业的巨大潜力，有很大一部分适宜农业生产的土地尚未得到有效利用。近年来，随着经济结构的转型，非洲农业也经历了快速增长，但其农业生产率仍然处于较低水平，农业发展面临一系列的挑战。为发展农业生产，解决粮食安全问题，非洲对国际资源、技术和经验有广泛需求。虽然总体上国际援助对非洲农业方面的投入相对不足，但近年来中非农业合作取得了令人瞩目的进展。中非农业合作的潜力在于双方资源禀赋的互补性，以及中非合作论坛和“中非农业现代化合作计划”等积极的政策性因素。为推进中非农业现代化合作，需要解决过去中非农业合作过程中面临的一些局限和不足，例如缺乏综合战略规划的指导和统筹协调；以双边的技术层面合作为主，缺少政策层面的沟通；未能将非洲农业发展的实际需求与中国发展经验和援助资源有效结合；语言、文化等方面的障碍和国际舆论的压力等。

为了有效应对挑战，有必要制定综合战略规划，指导中非农业现代化合作的未来发展，并借中国新成立国家国际发展合作署的契机，将中非农业合作制度化。综合战略规划将有助于统筹协调中国的投资援助，并在合作过程中有机对接非盟成员国推动发展的自身努力。制定此类规划需要将中国的农业发展援助与非洲自身的农业发展计划和政策相结合，并加强对《非洲农业综合发展计划》和非盟《2063年议程》的支持。此外，还需要考虑几个具体问题：应将研究和战略规划放在首位；在有助于了解非洲当地农业发展需求的政策对话基础上，需要通过实证研究提炼适用于非洲发展的中国经验，并在发展战略的指导下加强机构协调；在国际组织，双边发展机构和私营部门的支持下，应促进更广泛和更多样化的国际合作，整合多方的资源和优势，促进非洲的农业和经济发展，确保粮食安全，减少贫困；应当做好第三方影响评估，从而为改善中非农业合作项目的效果提供依据。

参考文献

[1] Badiane O, McMillan M. *Economic Transformation in Africa: Patterns, Drivers, and Implications for Future Growth Strategies in Beyond a Middle Income Africa Transforming African Economies for Sustained Growth with Rising Employment and Incomes* [R]. ReSAKSS, 2014.

[2] Davis B, Giuseppeb S D, Zezza A. Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa [J]. *Food Policy*, 2016, 67 :153-174.

[3] Diao X, Thurlow J, Benin S, Fan S. *Strategies and Priorities for African Agriculture: Economywide Perspectives from Country Studies* [M]. 2012.

[4] New Partnership for Africa's Development (NEPAD). Agriculture in Africa: Transformation and outlook [R]. NEPAD. 2013.

[5] Chen K Z, Hsu C, Fan S. Steadying the ladder: *China's agricultural and rural development engagement in Africa* [J]. China Agricultural Economic Review 6(1). 2013.

[6] United Nations Economic Commission for Africa and African Union Commission. *Economic Report on Africa: Unleashing Africa's potential as a pole of global growth* [R]. Addis Ababa: UNECA, AUC. 2012.

[7] International Fund for Agriculture Development (IFAD). *Rural Development Report 2016: Fostering inclusive rural transformation* [R]. Rome: IFAD. 2016.

[8] The Alliance for a Green Revolution in Africa (AGRA). *Africa Agriculture Status Report 2017: The Business of Smallholder Agriculture in Sub-Saharan Africa* [R]. Nairobi: AGRA. 2017.

[9] ICARD, IFPRI. 非洲农业研发的现状与技术需求 [R]. 中非农业技术转移机制及影响研究阶段报告. 北京：中国农业科学院海外农业研究中心. 2017.

[10] Mcmillan M, Rodrik D. *Economic Transformation in Africa* [C]. Transforming Agriculture Conference. Accra: IFPRI. 2012.

[11] Badiane, Ousmane. (2014). Agriculture and structural transformation in Africa. In Falcon, W.P. and R.L. Naylor (eds.), *Frontiers in Food Policy: Perspectives on sub-Saharan Africa*. The Center on Food Security and the Environment, Stanford University. Stanford, CA: Printed by CreateSpace.

[12] Diao X S, Harttgen K, Mcmillan M S, The changing structure of Africa's economies [J]. *The World Bank Economic Review* 31(2): 412-433. 2017.

[13] African Center for Economic Transformation. *African Transformation Report 2017: Agriculture Powering Africa's Economic Transformation* [R]. ACET. 2017.

[14] FAO. 联合国粮食及农业组织统计数据库[DB/OL]. http://www.fao.org/statistics/databases/zh/.

[15] Nin-Pratt, et al. *Yield gaps and potential agricultural growth in West and Central Africa* [M]. Washington, D.C.: IFPRI. 2015.

[16] Beintema N, Stads G-J. *Taking Stock of National Agricultural R&D Capacity in Africa South of the Sahara* [R]. ASTI Synthesis Report. 2014.

[17] Benin S. Agricultural public spending in Africa is Low and Inefficient. In Reaping Richer Returns: Public Spending Priorities for African Agriculture Productivity Growth [R]. *Africa Development Forum series*. Washington, D.C.: World Bank. 2017.

[18] International Food Policy Research Institute (IFPRI). *2016 Global Food Policy Report* [R]. Washington, D.C.: IFPRI. 2016.

[19] FAO. (2017). *The State of Food Security and Nutrition in the World*. Retrieved from FAO website: http://www.fao.org/state-of-food-security-nutrition/en/

[20] IFPRI. (2018). *2018 Global Food Policy Report*. Washington, D.C.: IFPRI.

[21] OECD, FAO. *OECD-FAO Agricultural Outlook 2016-2025* [R]. Paris: OECD. 2016.

[22] 卢琰.问题与出路 [J]. 中国投资2018. 06.

[23] The G8 Research Group at the Munk School of Global Affairs at Trinity College in the University of Toronto. *2012 Camp David G8 Summit Final Compliance Report* [R]. 2013.

[24] Chen K Z, Joshi P K. New Players and South-South Cooperation in Development. In *2011 IFPRI Global Food Policy Report* [R]. Washington D.C.: IFPRI 2012.

[25] The Chinese Academy of Agricultural Sciences(CAAS). (2018). *China Agricultural Sector Development Report*. Forthcoming.

[26] The World Bank. (2013). *Securing Africa's Land for Shared Prosperity: A Program to Scale up Reforms and Investments*. Washington, D.C: International Bank for Reconstruction and Development/ The World Bank.

[27] The Howard G. Foundation. (2015).*Africa's Potential for Agriculture*.: http://harvestingthepotential.org/brownrevolution/assets/africas_potential_for_agriculture.pdf

[28] 李嘉莉. 中非农业合作的现状与未来 [R]. 中国与非洲国际合作典型案例汇编. 北京：中国国际扶贫中心. 2011.

[29] Buckley L. *Narratives of China-Africa Cooperation for Agricultural Development: New Paradigms* [Z]? Future Agricultures Consortium working paper. 2013.

[30] Sun H L. *Understanding China's Agricultural Investments in Africa* [R]. The South African Institute of International Affairs. China in Africa' research project report. 2011.

[31] Wang X, Liu Q. China-Africa Cooperation: a New Approach to Improve Development Effectiveness [Z]. *Working Paper Series 5*. Beijing: International Poverty Reduction Center in China. 2012

[32] Brautigam D, Tang X. China's engagement in African agriculture: "Down to the countryside" [J]. *The China Quarterly,* Vol. 199: 686-706. 2009.

[33] Gabas J-J, Tang X. Chinese Agricultural Cooperation in Sub-Saharan Africa: Challenging Preconceptions [J]. *Perspective*. 2014 January. No.26.

[34] Kitano N, Harada Y. Estimating China's Foreign Aid 2001-2013 [J]. *Journal of International Development* J. Int. Dev. 28. 2016.

[35] 中国的对外援助（2014）白皮书 [Z]. 北京：中华人民共和国国务院新闻办公室. 2014.

[36] 鲁茉莉. 中英非农业三方合作研究 [J]. 世界农业. 2012. 404（12）: 13-21.

[37] 杨军等. 中非农产品贸易结构变化趋势、比较优势及互补性分析 [J]. 中国农村经济, 2012 (3).

[38] Zhang H. *A study of the VGGT and Extraterritorial Investments in Agriculture in African countries by Entities from China, India and South Africa* [Unpublished]. 2017.

[39] 国务院新闻办公室. 中国与非洲的经贸合作(2013)白皮书 [Z]. 2013.

[40] 农业农村部对外经济合作中心. 对非合作数据 [Unpublished]. 2018.

[41] 中华人民共和国商务部. 中非合作论坛约翰内斯堡峰会暨第六届部长级会议"十大合作计划"经贸领域内容解读 [Z]. 2015.

[42] 陈志钢，周云逸. 中英非农业发展三方合作案例 [Unpublished]. 新时期中非农业合作报告. 北京:对外经贸大学全球价值链研究院. 2018.

[43] 盖茨基金会. 正在推进的中国、非洲和盖茨基金会三方农业合作项目基本情况介绍. [Unpublished]. 2018.

[44] Brautigam D, Tang X. *An overview of Chinese agricultural and rural engagement in Tanzania* [Z]. Washington, D.C.: IFPRI. 2012.

[45] 洪坚鹏. 中非将推动巩固农业合作，加强科研成果转化 [N]. 中国新闻网. 2017-12-11. http://www.scagri.gov.cn/ywdt/hydt/201712/t20171211_524634.html

[46] 唐丽霞, 李小云. 援助的历史叙事：对非农业援助的逻辑 [M]// 李小云，唐丽霞, 陆继霞等. 新发展的示范：中国援非农业技术示范中心的微观叙事. 北京：社会科学文献出版社，2017.

[47] 陈天金.中非农业科研机构10+10合作研讨会在海口召开 [N]. 中国农业科学院国际合作局. 2018. http://gh.caas.cn/hzdt/126661.htm。

[48] 张悦, 李小云. 平行经验的分享：基于构建与嵌入的援助学习 [M]// 李小云，唐丽霞, 陆继霞等. 新发展的示范：中国援非农业技术示范中心的微观叙事. 北京：社会科学文献出版社，2017.

[49] Chichava S. *Chinese Agricultural Investment in Mozambique: the Case of the Wanbao Rice Farm* [Z]. Policy Brief. SAIS-CARI Conference. 2014.

[50] Smith D. The food rush: Rising demand in China and west sparks African land grab [N]. The Guardian. 2009-07-03. https://www.theguardian.com/environment/2009/jul/03/africa-land-grab.

[51] Brautigam D. *Will Africa Feed China?* [M]. New York: Oxford University Press. 2015.

[52] Maiyo J. *The Political Ecology of Chinese Agriculture Investment in Uganda: the Case of Hanhe Farm* [R]. Policy Brief. SAIS-CARI Conference. May 16 and 17, 2014.

[53] African Union. *Business Plan for Implementation of the CAADP-Malabo Declaration (2017–2021)* [Z]. *Volume 1: Main Text.* February 23, 2017. Addis Ababa: African Union.

[54] Johnson M, Benin S, You L, Diao X, Chilonda P, and Kennedy A. (2014). *Exploring strategic priorities for regional agricultural research and development investments in Southern Africa*.[M]. Washington, DC: International Food Policy Research Institute (IFPRI).

[55] You L, and Johnson M. (2008). *Exploring strategic priorities for regional agricultural R&D investments in East and Central Africa*.[M] Washington, DC: International Food Policy Research Institute (IFPRI).

[56] Wang J, Zhang Y, Chen K, and Nie F. *Impact of Transferring Chinese Hybrid Rice to Africa* [R]. Report submitted to the Center for International Agricultural Research, Chinese Academy of Agricultural Science.

[57] 中华人民共和国农业部，财政部. 关于开展国家现代农业产业园创建工作的通知 [Z]. 2017.

[58] Buckley L, Chen R, Yin Y, Zhu Z. *Chinese agriculture in Africa Perspectives of Chinese agronomists on agricultural aid* [R]. Discussion Paper. 2017.

[59] 龙刚. 反思非洲殖民主义遗产 [J]. 历史研究. 2013(05).

China-Africa Agricultural Modernization Cooperation:

Situation, Challenges, and the Path Ahead

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Acronyms

ATDC	agricultural technology demonstration center
AU	African Union
BMGF	Bill & Melinda Gates Foundation
CAADP	Comprehensive Africa Agriculture Development Programme
CAAS	Chinese Academy of Agricultural Sciences
CIDCA	China International Development Cooperation Agency
CIRAD	French Agricultural Research Centre for International Development
DAC	Development Assistance Committee
DFID	UK Department for International Development
DRC	Democratic Republic of the Congo
FAO	Food and Agriculture Organization of the United Nations
FECC	Foreign Economic Cooperation Centre of the Government of China
FOCAC	Forum on China-Africa Cooperation
FTE	full-time equivalent
GDP	gross domestic product
G8	Group of Eight
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
MOU	memorandum of understanding
NAIP	National Agricultural Investment Plan
NEPAD	New Economic Partnership for Africa’s Development
NGO	nongovernmental organization
NPO	nonprofit organization
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
SDGs	Sustainable Development Goals
UNDP	United Nations Development Programme
WFP	World Food Program

Executive Summary

African agriculture has grown significantly with the region's rapid economic transformation in recent years. The share of agriculture in gross domestic product (GDP) has declined significantly, while the share of agricultural employment is still high. Nevertheless, agriculture remains one of the most important sectors in Africa and is key to food security and poverty reduction in this region. Africa has around 930 million hectares biophysically suitable for agriculture, but a considerable part of that land has not been cultivated. And despite recent growth in agriculture, agricultural productivity in Africa is still low compared to other areas of the world. Agricultural development in Africa is challenged by a series of obstacles, including: unfavorable land property rights policy; poor agricultural infrastructure; low agricultural research and development (R&D) and insufficient public investment; low regional market integration; an underdeveloped private sector and the low efficiency of the government; the impact of international food price volatility and climate change; and political instability and conflicts. African countries are calling for more international resources, technology, and development lessons to help promote their agricultural development.

Foreign investment in Africa's agricultural sector has long been inadequate and assistance from traditional donor countries is far from meeting the needs of African countries to promote agricultural development. In this situation, China-Africa agricultural cooperation has attracted increasing attention. Such cooperation could be beneficial to both sides, given the complementarity of the agricultural resource endowments of China and Africa. At the same time, China is emerging as a strong player in international development assistance. During the 2015 summit of the Forum on China-Africa Cooperation (FOCAC), China announced ten key cooperation areas and promised US$60 billion in support. In particular, the China-Africa Agricultural Modernization Program is listed as one of the ten key cooperation areas. At 2018 FOCAC Beijing summit, China promised another US$60 billion to support eight major initiatives, proposing to work with Africa to formulate and implement a program of action to promote China-Africa cooperation on agricultural modernization in an industrial promotion initiative.

Since 1959, agricultural cooperation between China and Africa has established a solid foundation and China's assistance has grown rapidly. The scope of this cooperation has deepened and expanded from the initial free aid to a wider range of activities, including agricultural trade and investment. Agricultural cooperation has primarily taken place in four major modes: aid in construction of agricultural technology cooperation projects, agricultural development capacity building, dispatch of agricultural experts, and construction of agricultural technology demonstration centers. In addition, China-Africa agricultural trade has increased rapidly in the last two decades, especially since the implementation of China's zero-tariff policy for some African countries. Since 2006, China has significantly increased its direct investment in African agriculture, mainly concentrated in crop production, though increasingly diversified, and the share of private investment is also increasing in China's investment in African agriculture.

Over this period, China-Africa agricultural cooperation mechanisms have been continuously improved, beginning from their start in traditional bilateral cooperation. A multilateral dialogue mechanism for the FOCAC has been established and trilateral cooperation—with third-party partners such as international organizations, developed countries, and nonprofit organizations—has been introduced. Promoted by FOCAC and other mechanisms, China-Africa agricultural cooperation has made considerable progress, particularly in exchanges and training on agricultural technology and agricultural technology demonstration centers.

Despite the progress in practice, a number of challenges have been encountered and need to be addressed in future China-Africa agricultural modernization cooperation. First, a lack of comprehensive strategic planning and overall coordination has resulted in fragmentation of agricultural assistance and cooperation practices. Second, the previous China-Africa agricultural cooperation is heavy on technical assistance but short on policy and community development. Third, Chinese institutions and companies generally rely on a singular communication channel with the country governments during their participation in agricultural cooperation and assistance projects in Africa, with insufficient contact with civil society, the private sector, professional and community level organizations, and other bilateral development assistance agencies. Fourth, China’s agricultural projects in Africa usually lack responsiveness to local demand and are weak in terms of sustainability. In addition, language, culture, and capacity gaps in personnel exchanges still exist. Last but not least, these cooperation projects are sometimes met with skepticism from news media and public opinion, adding to the difficulties in operation.

Recently, the rise of trade protectionism and antiglobalism has exacerbated the uncertainty of world agricultural trade, posing considerable threats to China's and Africa's food security and agricultural development. China needs diversified partners for agricultural trade and cooperation for food security, and its Belt and Road Initiative highlights international agricultural cooperation as one of the best avenues for the construction of a community of shared interests and futures with the countries involved. At the same time, African countries, as key partners along the Belt and Road, have great potential for agricultural development. Therefore, agricultural modernization cooperation between China and Africa is to the benefit of both sides.

To address the challenges and fulfill the potential of China-Africa modernization agricultural cooperation in the new era, it is critical to formulate an integrated strategic plan to guide the future development of China-Africa agricultural modernization cooperation. Such a plan is expected to guide and align Chinese investments and collaborative activities with key development efforts of the African Union member states. The plan needs to align China's agricultural development assistance plan with Africa's own agricultural development plans and policies, as articulated in the Comprehensive Africa Agriculture Development Programme (CAADP) and the Africa Agenda 2063. Three layers of cooperation should be incorporated in the plan, including cooperation on the continental level, regional level, and national level.

Particular attention needs to be paid to the following issues in the development of this plan. First, policy research and strategic planning based on effective policy dialogue should be given the top priority. Second, China-Africa agricultural modernization cooperation should target Africa's agricultural development needs, aligning development cooperation with the African Union Business Plan for the Implementation of the CAADP–Malabo Declaration 2017–2021. Third, priority investment areas need to be identified based on local needs. Rice breeding programs and the construction of agricultural business parks could be potential flagship programs. Fourth, lessons from China applicable to Africa need to be extracted through empirical studies, and effective knowledge-sharing methods need to be developed. Fifth, the commercial operation of agricultural sector initiatives must be improved through the strengthened participation of the private sector for better sustainability. Moreover, broader and more diversified international cooperation should be promoted with support from international organizations, bilateral development agencies, nongovernmental organizations, and the private sector. The resources and advantages of multiple parties should be integrated to promote Africa's agricultural and economic development, ensure its food security, and reduce poverty. Finally, third-party impact evaluations should be conducted to improve the performance of China-Africa agricultural cooperation projects and dissemination of lessons.

China-Africa Agricultural Modernization Cooperation:

Situation, Challenges, and the Path Ahead

1. Agricultural Development in Africa under Rapid Transformation

Most countries in Africa are experiencing a rapid economic transformation [1]. Since the late 1990s, Africa has witnessed rapid economic growth, with a decreasing share of agriculture in gross domestic product (GDP). Nevertheless, agriculture is still one of the most important sectors in Africa. The rural population still accounts for the majority in Africa, and the agricultural sector is the main source of income for most of the rural population [2] and key to ending hunger in the context of rapid population growth [3]. Moreover, agriculture is the engine of economic transformation in Africa [4], and improvement of agricultural productivity is crucial for economic development and structural change. Especially for African countries in the early stage of economic development, agriculture is a major source of income and employment. Studies have shown that agriculture-driven growth contributes more to poverty reduction in Africa than growth driven by non-agricultural sectors [5]. However, agricultural development in Africa is being thwarted by a series of challenges such as climate change, natural resource degradation, conflicts, and refugee crises. It is difficulty for Africa to address these challenges on its own. This highlights the importance of international cooperation, which is seen as an effective way to promote African agricultural development.

1.1. Economic Transformation and Agricultural Development in Africa

1.1.1 Transformation of the Economic Structure in Africa

Since the beginning of the 21st century, Africa has become one of the fastest growing regions in the world, second only to East Asia [6]. The rapid growth of the African economy is accompanied by rising urbanization and transformation of the economic structure, which is changing the relative contribution of agriculture, manufacturing and service sectors to GDP [7].

African economic transformation has two key features. First, there is a continuing decline in the share of agriculture in GDP and employment [8]. World Bank data show a decreased share of agriculture in GDP in Sub-Saharan Africa, from 25.35% in 2002 to a level between 17% and 18% in 2016. According to the FAO statistics, the agricultural sector in Africa accounted for more than 60% of employment in 1991 but gradually declined to 53% in 2016. Another key feature of the economic transformation in Africa is the huge gap between the share of agriculture in GDP and its share in employment, as shown by the figures above. Until the recent recovery which started around the turn of the millennium, the sharp decline in the share of agricultural labor had not brought about a significant increase in GDP per capita [9] [10][11].

There is now evidence that African economies have successfully transitioned from growth-reducing to growth-enhancing structural change [1]. Overall, however, despite continued efforts to promote structural transformation, the economic transformation in Africa is still limited and incomplete compared to developing countries elsewhere [1]. The decline in the share of agriculture in GDP and employment has not been accompanied by an expansion of the manufacturing sector, as in the case of other regions, but by a rapid rise of the services sector, largely dominated by informal activities. Africa's economic transformation has therefore not increased the share of employment in the industrial sector to the extent that one would expect [12].

1.1.2 Agricultural Development in Africa

In the past two decades of economic growth, agriculture has also sustained growth for the longest period since independence in Africa. All regions have seen growth in agriculture, with a significant increase in total agricultural output. World Bank data show that agriculture value added[1] in Sub-Saharan Africa has achieved annual growth of 9.4% since 2000, slowing only during the 2008 food crisis and the period from 2014–2016. Between 2000 and 2017, Africa's agricultural output almost quadrupled.

The expansion of arable land has been a key factor for agricultural growth in Africa in recent decades. According to FAO statistics, the area of arable land and permanent crops in Africa increased from 167.3 million hectares in 1961 to 271.8 million hectares in 2015. However, agricultural productivity and crop yields in Africa are still at a low level. At present, Africa's crop yield per hectare is less than half of the world average, and the index of per capita agricultural production has only increased from 93.64 in 1961 to 98.86 in 2016. Agricultural productivity in Africa, including labor and land productivity, lags behind that of developing countries in Asia and South America [13].

Agricultural growth in Africa is volatile and exhibits regional disparities. According to FAO data, in 2016, Southern Africa's cereal yield was 3.27 t/ha, which is close to the world average. North Africa and Eastern Africa had crop yields of less than half of the world average. Western Africa's crop yield is also relatively low, at 1.24 t/ha; while Central Africa has the lowest cereal yield at only 1.05 t/ha, far below the world average [14].

1.1.3 Major Crops in Africa

Since the 1980s, with the changes in diets, the production structure of main crops in Africa has also undergone some changes. Traditional cereals such as millet have declined rapidly and are being replaced by rice and wheat, but traditional staples like maize continue to dominate the diets of eastern and southern Africa and have also experienced rapid growth in other parts of Africa [13]. Maize and cassava are still the most important food crops in West and Central Africa [15]. Since the early 1990s, the widespread adoption of improved maize, wheat and rice varieties in Africa has also contributed to the increase in production of these major crops.

[1] Agriculture, forestry, and fishing, value added (current US$), World Bank data, 2000–2017.

The importance of rice in the dietary structure in Africa has increased rapidly. However, rice production in Africa is still limited and rice supply is heavily dependent on imports. Between 1961 and 2017, the amount of rice imported in Sub-Saharan Africa increased from 431,000 tons to 14.165 million tons[1]. With the increase in demand, the harvest area of rice in Africa also expanded rapidly. In 1961, the area harvested of rice planted in Africa was less than 3 million hectares, and by 2016 it has increased significantly to 12.5 million hectares[2].

Maize remains the most important food crop in Africa. According to FAO data, Africa's corn acreage has increased from 15.416 million hectares in 1961 to 36.611 million hectares in 2016, and the yield has increased from 1.04 t/ha to 1.93 t/ha, nearly doubling, but still less than half of the world average.

Since 1961, the harvest area of wheat in Africa has been maintained at around 10 million hectares. Although the planting area has not increased significantly, with the adoption of improved varieties, increased usage of fertilizers, and improvement of irrigation conditions, the production quantity of wheat has experienced rapid growth with the increase in yield. African wheat yields have nearly tripled from 0.69 t/ha in 1961 to 2.60 t/ha in 2016, increasingly closer to the world average at 3.41 t/ha [14].

1.1.4 Agricultural Research and Development in Africa

The level of investment in agricultural R&D in Africa and the number of R&D personnel have grown over the past 40 years. Investment in agricultural R&D in Sub-Saharan Africa stagnated in the 1990s but resumed growing after 2000, rising from $1.2 billion in 2000 to $1.7 billion in 2011. The number of agricultural R&D personnel has also experienced rapid growth since 2000, with a 50% increase between 2000 and 2011, increasing to approximately 14,500.[3]

However, there is a significant regional imbalance in agricultural R&D investment in Africa. Nigeria, South Africa, and Kenya account for half of Africa's R&D investment, while 18 of the 38 African countries for which we have data still invest less than US$10 million annually in agricultural R&D. In some small countries, especially in the West Africa region, agricultural R&D investment showed negative growth from 2000 to 2011[16]. Moreover, compared with other regions of the world, African agricultural R&D is more dependent on funds from other countries and development banks, resulting in high volatility and a fragile state of agricultural R&D that makes long-term planning difficult.

Agricultural R&D in Africa is still dominated by government. Colleges and universities are playing an increasingly significant role in recent years, while nonprofit organizations and the private sector have played a very limited role.

[1] Regional Rice imports, Sub-Saharan Africa, USDA data, 1961-2017.
[2] Area Harvested, Rice Paddy, Africa(total), FAO data, 1961-2016.
[3] The number of personnel is full-time equivalent (FTE). Human resource and financial data consider the proportion of time researchers spend on R&D versus other activities. Three scientists who each spend half of their time on agricultural research would be counted as 1.5 FTEs.

1.1.5 Agricultural Public Spending in Africa

Overall, agricultural public spending in Africa is low and insufficient, as agriculture accounts for far too small a share of total public expenditure [17]. In the 1980s, the share of agriculture in public expenditures was more than 6%. However, structural adjustment led to a sharp decline in agricultural expenditures, which fell to an average of 2–3% by the 1990s. In the new century, African countries began to refocus on investment in agriculture, especially since African leaders reached agreement in the Maputo Declaration in 2003 that at least 10% of government budgets need to be invested in the agricultural sector each year. In 2003–2008, African agricultural public investment began to grow rapidly, at a rate of 6.6% per year [18], but after the 2008 food crisis growth slowed. By 2015, however, Africa's average growth rate of agricultural expenditure had recovered to around 4% [17].

Regional imbalance exists in terms of agricultural public expenditure in Africa. As of 2014 only Burkina Faso, Malawi, Mozambique, and Zimbabwe had met or surpassed the 10% target set by the CADDP requirement [4], while most countries are still spending below the 10% target. Some countries with low agricultural investment have even reduced agricultural public spending.

In addition to raising the level of funding, more efforts are needed to increase the efficiency of Africa's agricultural public spending. It is currently estimated that 1% increase in total agricultural spending is associated with a 0.1–0.3% increase in agricultural output. The return to total agricultural spending is estimated at only 11% [17]. The imbalance of public spending between different agricultural sub-sectors is also significant: governments tend to support staple crops, while sectors like livestock breeding have long been neglected [4].

1.2. Challenges for Agricultural Development in Africa

Despite noteworthy progress in the past decade, most African countries are still facing serious food security situations. According to the FAO [19], global hunger appears to be rising, with the estimated number of undernourished people increasing by 38 million in 2016, and this is particularly the case in Africa. Hunger levels, as measured by the Global Hunger Index (GHI), are still considered "serious" or "alarming" in most African countries; the regional GHI score for Africa south of the Sahara is considered "serious." [20] Improving agricultural and food systems is central to solving this problem; however, several challenges exist for agricultural development in Africa, hindering the growth of its agricultural productivity [21] [22]. These challenges are:

i) Unfavorable land property rights policy. The problem of unclear land property rights and the related lack of institutional and legal guarantees has hindered access to investment resources to boost production and modernize agriculture.

ii) Poor agricultural infrastructure. Agricultural infrastructure is generally poor in Africa with inadequate basic services in irrigation, electricity, transportation, and storage. Access to markets is limited by the poor transportation networks, resulting in higher levels of post-harvest losses and less efficient allocation of production inputs such as seeds and fertilizers.

iii) Low level of agricultural R&D and insufficient public investment. These problems are mainly a result of limited financial resources, which in turn leads to the low level of development of agricultural production and the lack of processing capacity for agri-food products. As a result, agricultural value chains are short and added value of products is low, making it difficult to form a sound food system.

iv) Low regional market integration. The relatively low degree of regional integration and intra-regional trade has restricted the expansion and integration of agricultural markets.

v) Underdeveloped private sector and the low efficiency of the government. Constrained by institutional, structural, and policy factors, the private sector in Africa receives limited support. Entry costs and the imperfections of law have contributed substantially to the lack of competitiveness of the private sector and limited its contribution to agricultural development. For a long time, Africa's agricultural development relied heavily on national governments and related institutions. The inefficiency of African government departments and insufficient institutional capacity are among the main factors hindering agricultural development. This situation is improving with the increased contribution of the private sector to economic growth in recent years, but there is still a long way to go to fulfill the private sector's potential.

vi) The impact of international food price volatility. Continued rapid increase in population, the fastest pace of urbanization in the world and rising per capita incomes over the last decade have turned many African countries into net importers of agricultural products. Africa's increased dependence on food imports leaves it vulnerable to fluctuations in international food prices.

vii) Climate change. In recent years, African agriculture has been facing severe challenges of increasingly frequent extreme weather and natural disasters affected by global climate change. The lack of infrastructure, including water conservancy and irrigation systems, makes African agricultural production particularly vulnerable to climate change.

In addition, political instability and social conflict in some African countries are damaging economic and social development, and agricultural production is particularly vulnerable to these destructive factors.

1.3. Opportunities for Agricultural Cooperation with Africa

African countries have gradually recognized the importance of agriculture for economic development and transformation. In 2003, the Maputo Declaration on Agriculture and Food Security was signed by the heads of State and Government of the African Union. The Comprehensive Africa Agriculture Development Programme (CAADP) was initiated to promote public investment in agriculture. CAADP serves as a continentwide framework for individual countries' agricultural development processes and comprises a small number of shared goals: to increase agricultural expenditures to 10% of total public expenditures and to achieve an annual agricultural sector growth rate of 6%. CAADP is implemented at the country level though a process that culminates in the development, review and

implementation of a National Agricultural Investment Plan (NAIP), which specifies investments and interventions in the agricultural sector designed to achieve CAADP and other development goals.

CAADP is the agricultural program of the New Economic Partnership for Africa's Development (NEPAD), which was adopted in 2001 as the framework for Africa's development initiatives and its partnerships with the international community. CAADP incorporates the NEPAD principles and values of African ownership and leadership, the alignment of development cooperation with Africa's own initiatives and priorities, participatory decision-making processes that are inclusive of the private sector and other nonstate actors, and mutual accountability of all partners for their commitments. The NEPAD/CAADP principles of inclusivity and mutual accountability are expressed in several mechanisms for participatory agricultural policymaking and review. These include multi-stakeholder NAIP validation meetings; country-level agricultural joint sector reviews, which allow state and nonstate actors to meet to discuss agricultural sector progress and review the status of commitments; and the continental Biennial Review, which assesses the progress of countries and regions toward CAADP goals.

As of August 2017, 42 African countries, a large majority, had initiated CAADP implementation, and 33 countries had completed and validated first-generation NAIPs. Many countries that had implemented NAIPs during the first decade of CAADP were beginning the process of developing second-generation NAIPs. Through CAADP, African leaders committed to robust public expenditure in agriculture. However, due to countries' challenging fiscal situations as well as the need to access lessons and technology from abroad, more international cooperation and assistance are needed to promote investment and agricultural development in Africa.

Official aid from the international community is insufficient and growing slowly. Since the mid-1980s, the international community's assistance to African agriculture has fallen along with the overall reduction of global aid to agriculture in developing countries. The proportion of official development assistance (ODA) distributed to the agricultural sector has fallen sharply over the past three decades, leaving ODA levels incommensurate with the importance of agriculture in the economic and social development of Africa.

Since the 2008 food crisis, Africa's need for international assistance and cooperation in food security and agriculture has become more clear. However, needs are large compared to the levels of assistance from the traditional development partners. For example, in 2009, the G8 collectively committed to providing developing counties and regions such as Africa at least US$20 billion for food security. Disbursement of these resources, planned to take place over several years, has been realized to different degrees by individual members [23]. In recent years, emerging economies have played an increasingly significant role as nontraditional donors in addressing global food security issues, and they are expected to grow into important players in Africa's international cooperation on agriculture [24].

At the 23rd African Union Summit in 2014, African leaders signed the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, reaffirming the principles and values of CAADP. In addition to recommitting to the key CAADP agricultural growth and expenditure targets, the Malabo Declaration

broadens the scope of CAADP and incorporates an extended set of goals in seven major thematic areas: recommitment to the principles and values of the CAADP process; enhancing investment finance in agriculture; ending hunger in Africa by 2025; halving poverty in Africa by 2025 through inclusive agricultural growth and transformation; boosting intra-African agricultural trade; enhancing resilience to climate variability and other risks; and committing to mutual accountability to actions and results. To achieve these goals, the Malabo Declaration calls on development partners to provide technical and financial support for the implementation of the declaration in a coordinated manner.

At the same time, African countries are seeking to establish a new type of development assistance relationship in which African ownership is emphasized, as called for with the establishment of NEPAD and reiterated in later strategies. The Agenda 2063 adopted at the 2015 African Union Summit advocates international cooperation that promotes and safeguards African interests, upholds mutual benefit, and aligns with the Pan-African vision. It calls for respect for African perspectives and willingness in international cooperation and appropriate adjustment of the partnerships.

With this background, China-Africa agricultural cooperation based on the principles of equality, mutual benefit, and win-win has sound foundations and immense potential. China is expected to play a greater role in international agricultural cooperation in Africa.

2. Situation and Effectiveness of China-Africa Agricultural Cooperation

2.1. Situation of China-Africa Agricultural Cooperation

China-Africa agricultural cooperation began in 1959 when China provided food aid to the Guinean government [28]. Over the next five decades, this cooperation deepened and expanded from the initial free aid to a wider range of activities, including agricultural trade and investment. Unlike conventional grant-based assistance, Chinese aid tends to be combined with investment and trade. As a result, the traditional boundaries between aid, investment, and trade are very much blurred and the involvement of participants is increasingly complex [29].

In the past few decades, China's economy has grown rapidly, and its significant achievements in agricultural development have drawn global attention to China's development experiences. Africa and other developing countries have shown strong interest in learning from China [28]. Since the establishment of the Forum on China-Africa Cooperation (FOCAC) in 2000, China has also been committed to building a new partnership from the old ties and accelerating agricultural cooperation with Africa, with agriculture and food issues as the top priority for its aid to Africa [30]. In 2013, the Chinese government published the second white paper on China-Africa Economic and Trade Cooperation, which clearly proposed to strengthen cooperation in agriculture and food security. On December 4, 2015, Chinese President Xi Jinping proposed the "Ten Major China-Africa Cooperation Programs" for the coming three years at the opening ceremony of FOCAC in Johannesburg, in support of which China committed US$60 billion in funding. The China-Africa Agricultural Modernization Program is listed as one of the ten major programs.

The form of China's agricultural cooperation with Africa has also changed in the past few decades. The beneficiaries of agricultural aid have shifted from large state-owned farms to smallholders in Africa, and aid covers an increasingly wide range of areas such as agricultural infrastructure, food production, animal husbandry, agricultural technology exchange and transfer, and the storage and transportation of agricultural products [31]. China has also tried new ways of combining aid and business cooperation, including joint ventures, cooperation contracts, and public-private partnerships [32]. China has accumulated a rich experience in agricultural reforms and therefore has advantages in agricultural technology, products, and capacities. Strengthening China-Africa agricultural cooperation can help African countries to improve their agricultural production technology and eliminate poverty.

2.1.1 China's Agricultural Aid to Africa

For a long time, compared with the member countries of the Organisation for Economic Co-operation and Development (OECD), China's assistance to African agriculture was relatively limited. According to a study by the French Agricultural Research Centre for International Development (CIRAD) [33], agricultural aid from China was about US$130 million from 2009 to 2013. That amount is estimated based on the cost of agricultural technology demonstration centers (ATDCs), and excludes multilateral aid, especially World Food Program (WFP) assistance. Meanwhile, donors of the OECD Development Assistance Committee (DAC)

committed $3 billion of bilateral and multilateral aid for agriculture and rural development in 2012 alone. The study also shows that 60% of China's agricultural aid projects are grants, while the other 40% are public or private loans. Moreover, the projects are concentrated in a few countries: Benin, Ghana, Mali and Senegal in West Africa account for about 60%, while Zimbabwe, Tanzania, and Mozambique in Southern Africa account for about 40% [33].

In recent years, China has become an increasingly important player in African agricultural aid. Due to difficulties with data or access to data, it is still hard to quantify the growth of China's agricultural assistance to Africa. On the one hand, there is no officially released data on China's agricultural assistance. On the other hand, there is no international consensus on the definition of foreign aid funds. For example, aid data from the OECD-DAC only include ODA [34], which differs from the Chinese government's definition of aid [35]. In addition, the blurred boundaries between aid, trade, and investment also cause problems for statistics on China-Africa agricultural cooperation [29].

Despite the lack of direct data on China's agricultural assistance to Africa, relevant research commonly holds that China's assistance has grown rapidly and its scope has also expanded in recent years, facilitated by the Forum on China-Africa Cooperation (FOCAC). First, China's overall assistance to Africa has expanded rapidly, especially technical assistance [36]. In the agricultural sector, China's assistance to Africa is mainly in the following modes [28]: The first is aiding in construction of agricultural technology cooperation projects. China's infrastructure construction and water conservancy projects for recipient countries have actively promoted local agricultural development and improved local people's livelihoods. By 2017, 160 agricultural aid projects had been completed, including 35 farms, 52 agricultural technology experimental and extension stations, 11 animal husbandry projects, 15 fishery projects, and 47 farmland water conservancy projects, with newly-plowed land of about 55,500 hectares. Second is agricultural development capacity building. Over the years, China has cooperated with recipient countries around human resources development in the agricultural sector to improve agricultural productivity. In the past few decades, China has helped train more than 10,000 agricultural technology and policy professionals. Third is dispatching agricultural experts overseas. Under the framework of FOCAC, the Chinese government has sent 104 senior agricultural experts and more than 50 agricultural technology groups to Africa. Fourth is the construction of agricultural technology demonstration centers. China has established 19 agricultural technology demonstration centers in African countries and an additional 5 centers are under development.

2.1.2 China-Africa Agricultural Trade

Before 2000, China-Africa agricultural trade was stagnant for a long time. After 2000, however, with the establishment of FOCAC and China's accession to the World Trade Organization (WTO), China-Africa agricultural trade developed rapidly. Especially since the implementation of the China's zero-tariff policy for some African countries in 2005, the agricultural export value from Africa has been growing. According to China's customs data, China's total agricultural trade volume with Africa increased from US$609 million in 2001 to US$5.411 billion in 2016, with an average annual growth rate of 15.68%. Imports increased rapidly, from US$187 million in 2001 to US$2.764 billion in 2016, with an average annual growth of 19.67%. Meanwhile, the export value increased from US$422 million to US$2.647 billion, with an annual growth rate of 13.02%.

China and Africa have high complementarity in their resource endowments for agricultural production. China imports oilseeds, textile raw materials, and tobacco from Africa, while it exports processed agricultural products such as tea, spices, vegetables and fruits as well as fishery products to Africa. Studies show that agricultural trade between China and Africa has been consistent with the comparative advantage of both sides [37]. Although China's state-owned enterprises still dominate the imports from Africa, private companies have surpassed state-owned enterprises in terms of exporting and have become the major players [5].

Affected by the overall downward trend of agricultural trade in Africa since 2011, the agricultural trade value between China and Africa decreased in 2014–2016. According to FAO's forecast in 2016, due to protectionist policies in various countries, the growth rate of world agricultural trade will slow in the next decade. Additionally, the slowing of economic growth of China, one of the main importers of African agricultural products, will likely have a negative impact on China-Africa agricultural trade [21].

2.1.3 China's Agricultural Investment in Africa

China's agricultural investment in Africa stems from the agricultural aid projects related to agriculture development, such as improving agricultural infrastructure, financing agricultural research, and farm construction [38]. For a long time, China’s direct investment in agriculture accounted for a small proportion of China’s total foreign direct investment [5]. However, since the third ministerial meeting of the FOCAC in 2006, China has significantly increased its direct investment in African agriculture. In 2009, China’s direct investment in African agriculture was about US$30 million [39] and, according to the statistics of the Foreign Economic Cooperation Center (FECC) of China's Ministry of Agriculture and Rural Affairs, the agricultural investment flow to Africa was US$210 million by 2015. By the end of 2015, China’s agricultural investment stock reached US$1.03 billion, and 113 agricultural enterprises had been established in 32 African countries, employing more than 30,000 local African employees, guiding nearly 200,000 farmers on agricultural production, generating a total output of food crops of 397,000 tons and economic crops of 110,000 tons, and contributing more than US$20 million in local taxes.

China's agricultural investment in Africa is concentrated in crop production, which accounts for 74% of China's agricultural investment stock in Africa. Fisheries account for 14.6% and agriculture service industries, forestry, and agricultural sideline products account for 8.9%, 1.3%, and 0.3%, respectively (FECC 2014). In recent years, China's agricultural investment in Africa has become increasingly diversified [5]. Agricultural investment has gradually shifted from government-led to market-driven with increasing scale, industrialization and clustering. Agricultural trade has gradually shifted from primary commodity trade to industrial cooperation and processing trade. The share of private investment is also increasing in China’s investment in African agriculture [40].

2.2. Mechanism of China-Africa Agricultural Cooperation

China-Africa agricultural cooperation mechanisms have been continuously improved, beginning from their start in traditional bilateral cooperation. A multilateral dialogue mechanism for the FOCAC has been established over time and trilateral cooperation—with third-party partners such as international organizations, developed countries and non-profit organizations—has been introduced.

2.2.1 Expanding Bilateral Cooperation

First, China-Africa bilateral cooperation has been deepening. High-level exchanges between China and African countries in the agricultural sector have become increasingly frequent. Nearly 100 high-level delegates from African countries have recently visited China, and Chinese agricultural leaders have visited Africa frequently. Through these high-level visits, experiences in agricultural development are exchanged, cooperation mechanisms are established, and cooperation priorities are discussed, which lays the foundation for China-Africa agricultural cooperation. By the end of 2015, the Chinese Ministry of Agriculture had signed 33 agreements on agriculture, livestock, and fisheries with 18 African countries including South Africa, Egypt, and Ethiopia, and established agricultural working group mechanisms with South Africa, Egypt, Sudan, Eritrea, Tanzania, Mozambique, Kenya, Zambia and Namibia [40]. In addition, the Ministry of Agriculture has organized a series of agricultural investment promotion activities in African countries and supported participation by relevant experts and enterprises in agricultural investment seminars organized by Chinese embassies and consulates in African countries. China has brought Chinese enterprises to Africa, gained in-depth understanding of the needs and investment environment of African countries, and established a platform for face-to-face exchanges between Chinese and African companies.

2.2.2 Agricultural Cooperation under the FOCAC

In 2000, under the joint initiative of China and Africa, the first ministerial meeting of FOCAC was held in Beijing. The FOCAC was formally established, creating a platform for multilateral dialogue between China and Africa that has promoted China-Africa agricultural cooperation at various levels. Since its establishment, agriculture has been regarded as a major area of China-Africa cooperation. Through the continuous efforts of earlier forums, China and Africa have reached consensus on agricultural cooperation, clarified specific areas of cooperation, and made food security a priority for cooperation. Important steps were made to advance agricultural technology exchange and human resource development. Trilateral cooperation under the framework of the FOCAC has also made substantial progress, including agricultural cooperation under the FAO Special Programme for Food Security and trilateral agricultural cooperation between China, the United Kingdom (UK), and Africa.

In the recent years, agricultural cooperation under the FOCAC framework has been further deepened. In 2010, the Ministry of Foreign Affairs and the Ministry of Agriculture jointly hosted the Forum on China-Africa Agricultural Cooperation in Beijing, and the government and political party leaders of 18 African countries exchanged strategic perspectives and opinions on common concerns, such as sustainable agricultural development, global climate

change, and disaster prevention and mitigation. Afterwards a declaration was issued, in which China pledged to support African countries to independently implement CAADP.

At the Johannesburg Summit of the FOCAC in 2015, President Xi Jinping put the China-Africa Agricultural Modernization Program on the agenda as one of the “Top Ten Cooperation Areas” to be implemented together with Africa over the next three years. China is committed to sharing agricultural development experiences with Africa, transferring agriculturally applicable technologies, encouraging Chinese companies to carry out large-scale planting, livestock farming, grain storage and processing in Africa, and increasing local employment and farmers' income. China plans to implement 100 pilot projects on enhancing farmers’ income through agricultural development in Africa, dispatch 30 agricultural expert groups to Africa, and establish a research exchange and capacity building program between China and Africa called the “10+10” cooperation mechanism. China was highly concerned about the adverse impact of the poor harvest caused by the El Niño phenomenon in many African countries in 2015 and promised to provide 1 billion yuan in emergency food aid to the affected countries [41]. At the 2018 Beijing Summit of FOCAC, Chinese President Xi put forward that China “will support Africa in achieving general food security by 2030, work with Africa to formulate and implement a program of action to promote China-Africa cooperation on agricultural modernization, implement 50 agricultural assistance programs, provide RMB 1 billion of emergency humanitarian food assistance to African countries affected by natural disasters, send 500 senior agriculture experts to Africa, and train young researchers in agri-science and entrepreneurs in agri-business[1].”

To further promote communication and cooperation between China and Africa, the first China-Africa Agricultural Cooperation Symposium was held in Hainan in 2013. In December 2017, at the fourth successful Symposium, representatives from China, African countries and international organizations signed eight cooperation agreements and reached important consensus on how to deepen China-Africa scientific and technological cooperation in the new era; identified key issues and cooperation elements of China-Africa scientific and technological cooperation; and decided to hold China-Africa agricultural cooperation symposiums regularly, establish a “10+10” cooperation mechanism for agricultural research institutions in China and Africa, promote the implementation of the 2015 FOCAC Johannesburg Summit consensus, and deepen cooperation under the framework of the FAO, the World Food Program (WFP), and the International Fund for Agricultural Development (IFAD). It was also suggested that the African Union should take a leading role in coordination and promotion of China-Africa agricultural science and technology cooperation.

2.2.3 Trilateral South-South Cooperation with United Nations Agencies

China and Africa have made a series of collaborative efforts in the agricultural sector aiming to promote food security within the framework of FAO's Special Programme for Food Security. China has also been working together with the WFP and IFAD in developing agricultural training programs in Africa through a trilateral South-South Cooperation approach in recent years.

[1] Full text of Chinese President Xi Jinping's speech at opening ceremony of 2018 FOCAC Beijing Summit. http://www.xinhuanet.com/english/2018-09/03/c_129946189.htm.

Launched in 1994, FAO’s Special Programme for Food Security is a major initiative designed to support low-income food deficit countries in their efforts to improve food security, and serves as an important step to propel South-South Cooperation in agriculture. The joint South-South Cooperation efforts between FAO and the Ministry of Agriculture of China date back to 1996 in Ethiopia, when China was among the earliest participating nations, and since then China has sent the largest number of staff . Fueled by the excellent work of the FOCAC, China stepped up its support by announcing, in 2008 and in 2014, contributions totaling US$80 million to FAO for the South-South Cooperation program. China is, to date, the strongest proponent of the initiative, making the largest donations, and providing the largest number of experts. According to statistics from the FECC of the Ministry of Agriculture of China, as of May 2018, 950 Chinese experts and technicians have been assigned to work in African countries, including the Democratic Republic of Congo (DRC), Uganda, Namibia, Ethiopia, Liberia, Senegal, Nigeria, Mali, Sierra Leone, Malawi, Gabon, Ghana, and Mauritania. Their work of demonstrating and promoting more than 200 practical agricultural techniques in these nations has helped to facilitate the progress of local agricultural technologies.

2.2.4 South-South-North Trilateral Cooperation

In addition to efforts to establish trilateral South-South cooperation with international organizations, China has also explored ways to form South-South-North partnerships by engaging developed countries in the agricultural collaboration between China and African nations. In November 2008, the China-UK Memorandum of Understanding (MOU) on Cooperation on Sustainable Agriculture was signed in Beijing between the Chinese Ministry of Agriculture and the UK's Department for Environment, Food and Rural Affairs. To help enhance global agricultural production capacity, the two countries pledged to make joint efforts in the fields of food security and agricultural research, and to strengthen cooperation and exchanges in agriculture between China, the UK, and Africa. The MOU formally recognized and marked the commencement of this trilateral agricultural cooperation. Under this trilateral development cooperation framework, a £10 million program [42] funded by the UK Department for International Development (DFID) was launched in 2012, focused on agricultural technology transfer from China to low-income countries in Africa and Asia. Two pilot projects in this program were successfully executed by 2017: one for cassava value chain development in Uganda and the other for tilapia production in Malawi. A Research Challenge Fund (RCF) was also set up to select and support 11 collaborative research projects. The South-South-North trilateral cooperation model leverages each party’s strengths, integrates China’s practical agricultural technologies with the UK’s funds and Africa’s natural resources, and creates a mechanism for effective trilateral cooperation to provide Africa with agricultural and management techniques that best suit its needs.

2.2.5 Trilateral Cooperation with Other Development Partners

The agricultural development partnership between China and Africa is expected to be supported not only by international organizations or developed countries but also by nontraditional development partners, such as nonprofit organizations (NPOs). Attempts have been made to engage NPOs as the third pillar in triangular cooperation. For instance, the Bill

& Melinda Gates Foundation, CGIAR, and the Africa Rice Center (AfricaRice) are working closely with their partner organizations in China and Africa to initiate a trilateral cooperation program with China's agricultural research institutions, China's ATDCs in Africa, and Chinese experts on agricultural technology dispatched to Africa. The goal of the partnership is to make full use of the existing technologies and platforms of the Africa Rice Center in order to introduce, absorb and utilize China's technologies for hybrid rice, upland rice, ratoon rice, conventional rice, and several types of stress-resistance rice in Africa. It is expected that significant improvements in rice yields and production will achieved through the practice of selective breeding, breed improvement, experimentation, demonstration, and promotion in the region's 12 major rice-producing countries (Nigeria, Senegal, Sierra Leone, Madagascar, Ethiopia, Tanzania, Mozambique, Côte d'Ivoire, Mali, Uganda, Burkina Faso, and Liberia). As a result, the rice self-sufficiency rate in Africa will increase and farmers, especially small famers, will become more resilient in the face of extreme weather, droughts, floods and other natural disasters. Implementation of the project will help achieve the goals of poverty eradication, hunger reduction, and food security in Africa and accelerate the pace of its agricultural transformation [43].

2.3. Key Achievements of China-Africa Agricultural Cooperation

Under the impetus of the FOCAC, the Chinese government helped build agricultural technology demonstration centers (ATDCs), supplied senior agricultural experts and technicians, and imparted best practices in management and practical techniques in agricultural production. With these contributions, China has made some progress in enabling Africa's growth in the agricultural sector.

2.3.1 Exchanges and Training on Agricultural Technology

African countries are proactively seeking opportunities to work together with China on agricultural technology exchanges and training. In 2001, the Chinese Ministry of Agriculture signed the "Letter of Intent on Cooperation in Agricultural Vocational Education and Training and Green Certificates" with its counterpart in Ethiopia and the two countries began to boost cooperation in this field[44]. The Ethiopian government agreed to provide funding and oversee selection of the teachers while the Chinese government is responsible for the organization of the dispatched teachers. The Chinese government has worked with the government of Ethiopia to implement more than 10 cooperative projects for agricultural vocational education and training since 2001. More than 300 teachers have been assigned to Ethiopia to teach 48 courses in six subjects—crop cultivation, animal husbandry, veterinary medicine, agricultural machinery, home economics, and natural resources exploitation—and have trained nearly 70,000 students. In addition, the initiative helped Ethiopia establish a relatively complete agricultural vocational education system of its own[28].

The Chinese government attaches great importance to bilateral agricultural technology exchanges and cooperation with Africa and leverages multiple funding sources. Foreign aid funds managed by China's Ministry of Commerce and funds from China's Ministry of Foreign Affairs, China's Ministry of Finance, FAO, WFP, and other international organizations provide

adequate financial support for the training projects aimed at capacity building in Africa. Since 2006, China's Ministry of Agriculture has held 260 training sessions in China and has trained 4,980 agricultural officials and technicians from 54 African countries[45]. As of December 2015, to deliver on its promises in the Johannesburg Declaration of the FOCAC Summit, China enhanced its support for capacity building for African countries. Special funds for international cooperation and exchanges in the agricultural field were earmarked for agricultural policy and technique training projects targeting China's key African partner countries. China also sent several teams of experts on agricultural technologies and instructors for vocational education and training under the framework of bilateral aid. Hundreds of technical experts and teachers dispatched to Africa provided policy advice, imparted practical techniques, carried out training, experiments and demonstrations, and delivered theoretical courses. According to statistics from FECC, in 2016 the Chinese Ministry of Agriculture held 49 training sessions for African participants and trained 939 people, of whom 836 did short-term courses in China, 85 received training outside China, 18 were in graduate programs, 39 in a training program funded by special funds for international agricultural cooperation and exchanges, 38 in FAO's South-South Cooperation training project, and 16 in the South-South Cooperation program jointly initiated by the Chinese government and WFP.

2.3.2 Agricultural Technology Demonstration Centers

Following the 2006 Beijing FOCAC Summit, at the request of African countries [46], China began to build agricultural technology demonstration centers (ATDCs) in Africa. This is an innovative agricultural cooperation model that combines aid and business [44]. Reported numbers of completed demonstration centers differ, though only slightly, in different reports and papers. According to the latest data provided by the FECC, China has established 19 ATCDs in African countries and an additional 5 centers are under development. Several agricultural technology cooperation projects have also been implemented.

As yet, the effectiveness of ATDCs has not been systematically assessed by a third-party independent evaluation. Nevertheless, a few initial results have been achieved. China's rice-planting demonstration projects in countries such as Sierra Leone, Tanzania and Madagascar have improved rice yields significantly compared to local varieties. Under the training and guidance of Chinese experts, local technicians and farmers have begun to master high-yield cultivation techniques for hybrid rice. Through experimental research, technical training, and demonstration and promotion, a significant number of practical Chinese agricultural technologies have been demonstrated and promoted in Africa. A considerable number of agricultural management personnel, technical personnel, and local farmers have been trained, and a number of crop and livestock varieties suitable for the local environment in Africa have been selected and promoted in China's aid projects. The deployment of agricultural technology in the demonstration centers has played a positive role in promoting the development of agricultural industry in Africa and in advancing the agricultural and rural economic development of the recipient countries. Table 1 shows the situation of the completed ATDCs in Africa.

Table 1. Construction Status and Stage of ATDCs in Africa

Country	Implementation Unit	Stage of Cooperation
Mozambique	Hubei Agricultural Reclamation Group	Entering the stage of commercial operation
Sudan	Shandong Foreign Economic Group	Entering the stage of commercial operation
Liberia	Hunan Longping Hi-Tech Company	Entering the stage of commercial operation
Benin	China Agricultural Development Group	Entering the stage of commercial operation
Tanzania	Chongqing Zhongyi Seed Company	Entering the stage of commercial operation
Rwanda	Fujian Agriculture and Forestry University	Enters the stage of commercial operation
Republic of Congo	Chinese Academy of Tropical Agricultural Sciences	Entering the stage of commercial operation
Zimbabwe	Zhongji Meno Company	Entering the stage of commercial operation
Uganda	Sichuan Huaqiao Fenghuang Group	Entering the stage of commercial operation
Togo	Jiangxi Huachang International Company	Entering the stage of commercial operation
Ethiopia	Guangxi Bagui Company/Liaoning International	Entering the stage of commercial operation
Malawi	Qingdao Ruichang Cotton Industry	Entering the stage of commercial operation
South Africa	China Agricultural Development Group	Entering the stage of technical cooperation
Cameroon	Shanxi Overseas Investment Company	Entering the stage of technical cooperation
Zambia	Jilin Agricultural University	Entering the stage of technical cooperation
Democratic Republic of the Congo	Zhongxing Energy co., LTD.	Entering the stage of technical cooperation
Mauritania	Ningxia Jinfulai Sheep Company	Entering the stage of technical cooperation
Mauritania	Heilongjiang Yanlin Technology Company	Entering the stage of technical cooperation
Equatorial Guinea	Jiangxi Ganliang Industrial Company	Entering the stage of technical cooperation
Angola	Xinjiang Construction Corps	Entering the construction stage

Note: For the operation of ATDCs, there are three stages. In the first stage of construction, infrastructure is built by the contract implementer (typically the company) in 1-2 years funded by the Chinese government. The second stage is 3 years of technical cooperation, during which period the Chinese government provides funding to maintain the daily operation of the ATDCs, including expenses for agricultural materials, experimental research, Chinese experts, and personnel training. The third stage is the commercial operation stage which lasts 5-10 years, and during which companies are expected to engage as a main player to conduct commercial operations for sustainable development.

Source: Foreign Economic Cooperation Center, Ministry of Agriculture, PRC, 2018

3. Challenges for China-Africa Agricultural Modernization Cooperation

After decades of effort, China has made considerable progress in its agricultural cooperation with African countries. Meanwhile, a few challenges have been encountered for China-Africa agricultural modernization cooperation. Based on the interviews with relevant stakeholders, the main challenges related to current practices are described here.

3.1. Lack of Comprehensive Strategic Planning and Overall Coordination

For a long time, China-Africa agricultural cooperation have been mainly based on the bilateral cooperation between the Chinese Ministry of Agriculture and African countries. Cooperation projects are small and scattered and lack the guidance of a comprehensive strategic plan. In 2015, President Xi Jinping put the "China-Africa Agricultural Modernization Program" on the agenda, but no specific strategy and action plan have yet been formulated. Without the guidance of overall strategic planning, it is difficult to design China-Africa cooperation projects rationally, coordinate among participating institutions, or effectively allocate aid resources. The result is fragmentation of agricultural assistance and cooperation practices.

On the one hand, with the expanded number of institutions and project types in agricultural assistance and cooperation, the overlapping and duplicated objectives and content between different institutions and their cooperation projects may result in wasted resources. Although China has a high-level coordination mechanism for foreign aid, different ministries administer assistance to multilateral institutions, bilateral country assistance, and assistance from different departments as well as financial assistance, material and technical assistance, and economic assistance. Such practices cause the fragmentation of foreign aid management in China. On the other hand, the lack of strategic focus on key areas often dilutes the resources allocated agricultural cooperation. Apparent underspending of Chinese aid on agriculture makes it difficult to achieve a breakthrough to help African countries through agricultural cooperation. In addition, the existing China-Africa agricultural cooperation practices are largely bilateral cooperation at the national level, based on the agricultural cooperation agreements between China and individual African countries and there is a lack of regional cooperation.

3.2. Heavy on Technical Assistance but Short on Policy and Community Development

At present, China-Africa agricultural cooperation is mainly based on technical exchanges and cooperation. Technology demonstration centers, personnel exchanges, and training are relatively innovative and fields where China has comparative advantages in agricultural technical assistance, but these agricultural cooperation projects are limited to the technical level. Socio-policy-cultural factors of technology diffusion have not been fully considered and there has been little attention to African community development issues.

In addition to investment in agriculture and technical cooperation, African countries also need to exchange experiences with international partners at a broader level, such as policy and community development. The differences in institutional and policy aspects of agricultural development between China and Africa will affect their agricultural technology cooperation. For example, the advancement of China's agricultural technology is closely related to the policy for and rapid development of agricultural infrastructure promoted by the Chinese government, and the promotion of Chinese agricultural technology in Africa faces the difficulties caused by inadequate investment in local agricultural infrastructure [48]. It is fundamental to improve the institutional and policy environment for agricultural development in Africa. Experience sharing at the institutional and policy level is an important means to deepen agricultural cooperation. However, a systematic review and summary of China's experience in agricultural and economic development policies that are also relevant for Africa is lacking. Without a platform and means of knowledge sharing, there is inadequate policy dialogue on agricultural development between China and Africa; particularly lacking is systematic sharing of institutional experience.

3.3. Government-Centric Communication and Cooperation Channels

Chinese institutions and companies generally rely on a singular communication and cooperation channel with the governments during their participation in agricultural cooperation and assistance projects in Africa. They have less contact with civil society, private sector professional and community level organizations and do not establish collaborative mechanisms with other bilateral development assistance agencies.

First, there is a need to establish dialogue mechanisms with local communities and civil society organizations. Local elites and social groups play a vital role in the African economy and society as a link between the government and their communities. But Chinese institutions and companies often ignore the need for interaction and collaboration with local elites and social groups. Failure to make effective use of this channel inhibits better understanding of the local needs in Africa and deepening of connections with local society. It can also lead to misunderstanding among partners. In some cases, Chinese engagement was criticized and resisted by local social groups in the implementation of projects [49]. Lack of cooperation with other third-party organizations also leads to isolation from public opinion.

China-Africa agricultural cooperation projects are often dominated by the Chinese institutions, lacking the participation of local African communities and private enterprises or cooperation with other bilateral aid agencies. Some China-Africa agricultural cooperation projects cannot accurately be called "mutually beneficial and win-win" cooperation. On the one hand, China's unilateral assistance accounts for a substantial proportion of cooperation. Therefore, the project design is typically led by Chinese organizations with limited local inputs. In the implementation of such projects, local players usually lack necessary understanding or participation, which limits in-depth cooperation. On the other hand, when Chinese companies invest in agricultural projects in Africa, they tend to employ Chinese subcontractors rather than working with local private companies or employing and training local labors [49]. However, fostering the endogenous motivation of African countries for deeper agricultural and economic development

through these agricultural cooperation projects is difficult without sufficient participation of local private enterprises, which could exert a far-reaching and lasting effect on the economic and social development of Africa.

Since 2015, in order to support other developing countries in implementing the goals of the 2030 Sustainable Development Agenda, the Chinese government has established a “South-South Cooperation Assistance Fund” (SSCAF) for foreign aid. The SSCAF encourages multilateral and tripartite cooperation among relevant participants, including social organizations in China and recipient countries, think tanks in China and abroad, and international organizations, etc., by means of joint establishment of sub-funds in relevant areas of assistance, and the exploration of public-private partnerships in foreign aid cooperation. The SSCAF provides a new mechanism and platform for China-Africa tripartite agricultural cooperation, but there are also some limitations in the cooperation under this mechanism. For instance, budget constraints set by the SSCAF make the projects supported by the fund small in scale and relatively scattered.

3.4. Lack of Responsiveness to Local Demand and Weakness in Sustainability

Faced with different agricultural development conditions and demands among African countries, China-Africa agricultural cooperation projects often fail to accurately grasp the actual needs of Africa and lack alignment with African agricultural development policies. This has hindered China’s agricultural aid and agricultural cooperation projects from fulfilling their potential in contributing to Africa’s agricultural development.

Furthermore, the existing China-Africa agricultural cooperation project lacks an interface with Africa's own agricultural development plans and policies. In 2003, the AU Summit adopted the Comprehensive Africa Agriculture Development Programme (CAADP). CAADP actively promotes international cooperation in agricultural infrastructure, agricultural product marketing facilities, supporting small farmers, and agricultural research and promotion. At present, close to 40 African countries have developed specific national investment plans (NAIPs) for agricultural development. However, in the process of promoting China-Africa agricultural cooperation, China has yet to effectively link its investments in Africa with CAADP or country NAIPs. In recent years, China has gradually realized the necessity of supporting CAADP, but has yet to find an entry point for effective collaboration. How to facilitate Africa's own agricultural public investment through Chinese agricultural aid to Africa remains a great challenge to China-Africa agricultural cooperation.

Finding an effective mechanism to engage with countries and support the implementation of country investment plans would have several advantages. NAIPs define clear national priorities and targets that can be supported by China directly or can serve as guidelines for the design and implementation of new stand-alone projects. The NAIPs also provide the opportunity for complementarity and coordination between investments by China and other developing partners. Finally, engagement around the NAIPs creates the opportunity to join country dialogue and review processes to enhance the quality of China’s partnerships with individual countries.

Moreover, natural endowments and the needs and priorities of developing agriculture vary from country to country in Africa. African countries are increasingly recognizing the need to upgrade agricultural value chains and create jobs through agricultural cooperation. Chinese institutions and enterprises in Africa generally have insufficient knowledge of local policies, marketing, and social needs, which may lead to the failure to achieve pre-designed project goals [48]. Whether China-Africa cooperative projects such as agricultural technology exchange projects can meet objectives and the actual needs of different African countries also greatly affects the effectiveness of China-Africa agricultural cooperation. This poses a challenge to China's agricultural cooperation and assistance for Africa.

Finally, the question of sustainability of China-Africa cooperation projects poses a real challenge. For example, the China-Africa ATDC initiative has made innovative efforts in agricultural cooperation drawing on earlier experience with China-Africa agricultural technology transfer mechanisms, but it is still highly dependent on funding from the Chinese government. Often the enterprises are unable to continue operating beyond the end of the funding period, due to the lack of funding and policy support. Sustainability is difficult to achieve.

3.5. Language, Culture, and Capacity Gaps in Personnel Exchanges

In the past, China lacked a specialized international aid agency, and struggled with a low level of aid personnel and professionalism. The selection and training of the dispatched personnel is mainly conducted by contractors in charge of aid projects, and in practice is far from meeting actual needs. Chinese personnel engaged in agricultural cooperation projects in Africa often lack experience in foreign aid management and sufficient knowledge of local culture, social norms, policies, and regulations. The complex economic and social situations in some African countries challenge their ability to develop relationships with local communities and organizations. In addition, limited by educational background, many Chinese personnel face language barriers in communicating with local African partners, employees and residents. To overcome the language or cultural barriers and improve the capacity of the dispatched personnel, it would be useful to make full use of the fruit of earlier China-Africa agricultural exchanges and training, encouraging African students who have studied in China to actively participate in China-Africa agricultural cooperation.

3.6. Skepticism from News Media and Public Opinion

The international community pays considerable attention to China-Africa cooperation and China's agricultural engagement in Africa [44]. For a long time, a few media outlets have depicted China’s engagement in Africa as new “colonialism”, particularly China's agricultural investment in Africa, which has been described by the media as new “land-grabbing” [50]. It is argued that, because China is facing pressure from population growth, reduced arable land, and food insecurity, it is now turning to agricultural resources in Africa. Although a few studies have shown that the accusations of China's land-grabbing in Africa are not based on facts [51], these negative reports still put enormous public pressure on China-Africa agricultural cooperation.

In addition, local African society and media also have concerns about the negative impacts of China's agricultural projects in Africa. In some extreme cases, for the political purpose of triggering public backlash, opposition parties in African countries have used the media to exaggerate the negative impact of Chinese investments and aid projects on the environment, land deprivation, and violations of labor rights, making the China-African cooperation project a divisive issue in local political games [52].

As yet, Chinese media coverage about China-Africa agricultural cooperation is mainly domestic and rarely engages with international discussion or disputes. The lack of voice from China and other neutral third-party institutions among relevant international public opinions is not conducive to creating a favorable public media environment for China-Africa agricultural modernization cooperation.

4. The Path Ahead: Strategic Planning for China-Africa Agricultural Modernization Cooperation

Agricultural cooperation between China and Africa is to the benefit of both sides. On the one hand, as is illustrated in the previous section, Africa is calling for international assistance to promote its agricultural development. On the other hand, participation in international agricultural cooperation is also in line with China’s national strategy. Recently, the rise of trade protectionism and antiglobalism has exacerbated the uncertainty of world agricultural trade, posing considerable threats to China's and Africa's food security and agricultural development [25]. China is looking for diversified partners in agricultural cooperation to guarantee its food security, especially in the context of increased trade conflicts. In 2013, China proposed a major initiative to jointly build the "Silk Road Economic Belt and the 21st-Century Maritime Silk Road" (referred to as the "Belt and Road" initiative). Under this initiative, international agricultural cooperation has become one of the best avenues for the construction of a community of shared interests and futures with countries along the line. At the same time, African countries, as key partners along the Belt and Road, have great potential for agricultural development. According to a World Bank report, Africa possesses the largest area of land that can be brought under the plow [26], with around 930 million hectares of African land area biophysically suitable for agriculture [27], but only a small part of that land is under cultivation. If Africa’s agricultural potential could be better realized through agricultural cooperation, it would not only alleviate hunger in Africa, but also contribute to global food security.

With the 2015 proposal of China-Africa cooperation by President Xi, China and Africa have ushered in new opportunities in agricultural cooperation. In 2018, China carried out a new round of institutional reforms, including reforms of its aid infrastructure. This is also a new opportunity to adjust and optimize international agricultural cooperation and foreign aid in China. After the initial institutional set-up, it is necessary to integrate the foreign aid responsibilities and strengthen the strategic planning and overall coordination of China-Africa agricultural cooperation for the systematic optimization of agricultural aid activities. This could be promoted by unifying the management of agricultural aid work and putting the newly established China International Development Cooperation Agency (CIDCA) in a proper position.

To fulfill the potential of China-Africa agricultural modernization cooperation in the new era, a scientific comprehensive strategic plan is needed to guide its development. At the 2018 Beijing Summit of the FOCAC, Chinese President Xi proposed to work with Africa to formulate and implement a program of action to promote China-Africa cooperation on agricultural modernization. And a strategic plan is expected to guide and align Chinese investments and collaborative activities with key development efforts by AU member states. It needs to align China's agricultural development assistance plan with Africa's own agricultural development plans and policies. In particular, the plan needs to support efforts to transform and modernize Africa’s agricultural sector and African economies under CAADP and the Africa Agenda 2063. Moreover, the plan should help enrich and deepen the levels of cooperation between China and Africa. An effective China-Africa cooperation plan must include appropriate measures to address the major challenges to China-Africa agricultural modernization cooperation identified above. In addition, several considerations, as discussed in the subsequent sections, need to be kept in mind.

4.1. Strengthen Strategic Planning and Coordination

First, to further promote China-Africa agricultural modernization cooperation, it is necessary to have a strategic plan and to strengthen the overall coordination of Chinese aid. Improving the dialogue mechanism and strengthening coordination and cooperation between departments of the line ministries in China are particularly important.

Second, at least three layers of cooperation need to be incorporated in the plan: the continental level, regional level, and country level. At the continental level, agreements need to be reached with the African Union to connect with CAADP for guidance and coordination support; at the regional level, countries will be grouped by similar natural endowments, needs, challenges and policy environment and regional economic communities are expected to play a role in promoting agricultural cooperation; and most China-Africa agricultural cooperation projects will mainly be designed at the country level, taking into consideration the different needs and stages of agricultural development among African countries and connecting to their NAIPs. The agricultural cooperation between China and African countries needs to be systematized by combining the three levels of cooperation.

Third, it is necessary to establish an effective dialogue platform for China-Africa agricultural cooperation. Establishing the China-Africa Agricultural Cooperation Forum as a long-term communication mechanism is critical to promote the development of all aspects of China and Africa agricultural cooperation.

4.2. Identify Specific Linkages with the Implementation of CAADP

China-Africa agricultural modernization cooperation should target Africa's local needs in its agricultural development. To this end, it is necessary to strengthen policy dialogue with Africa, learn from existing cooperation projects, identify gaps between the projects and local needs, and develop projects properly. China's goal of promoting agricultural modernization in Africa is fully compatible with African leaders' goal of accelerating agricultural growth and transformation. The key is to ensure that the specific investments of China's development cooperation are aligned with African countries' needs, conditions, plans and priorities.

An important entry point in aligning development cooperation with Africa's needs is the African Union Business Plan for the Implementation of the CAADP–Malabo Declaration 2017–2021[53]. The Business Plan provides a framework for action to achieve the CAADP and Malabo commitments and guides the alignment of development support to African priorities. It is arranged around seven strategic programs corresponding to the seven Malabo thematic areas, and 36 subprograms which support the achievement of targets for each strategic program. The programs include:

i) Strengthening country and regional systems for CAADP program delivery: This program is designed to build capacities for CAADP implementation at the national and regional levels through four subprograms concerning stronger agricultural sector policy planning; improved agricultural sector organization; enhanced coordination

and accountability mechanisms; and wider partnerships with the private sector, farmer organizations, and other actors.

ii) Expanding public and private investments: Through this program, the African Union supports countries to increase agricultural investments through subprograms to improve policy and regulatory frameworks to encourage private investments; increase the level and quality of public expenditures; increase foreign agricultural investments; ensure access to financing for agricultural investments; and enhance public-private partnerships and dialogue.

iii) Increasing agricultural productivity and strengthening nutrition and food security: This program is designed to support countries to achieve the Malabo goals of doubling agricultural productivity, halving post-harvest losses, and reducing child stunting to 10% and underweight to 5% by 2025. The goals will be pursued through subprograms to increase access to agricultural inputs and mechanization; improve post-harvest management; scale up homegrown school feeding and nutrition programs; expand biofortification of staple foods; strengthen food and nutrition knowledge management and coordination; and bolster social protection programs.

iv) Inclusive and sustainable agricultural production and accelerated agricultural growth: Related to program 3, this program will contribute to the Malabo goals of maintaining a 6% annual agricultural growth rate; halving poverty, with at least 50% of poverty reduction achieved through inclusive agricultural growth; and doubling productivity. Subprograms include sustainable land management and governance; improved irrigation and water management; improved animal resources development; strengthened technology generation, dissemination and adoption; broadened agricultural entrepreneurship opportunities for women and youth; and competitive value chain and agro-industry development.

v) Achieving expanded and competitive intra-African trade in agriculture: The objective of this program is to support countries and regions in achieving the Malabo target of tripling intra-African agricultural trade by 2025. The subprograms include policy and trade regime harmonization; improved food safety standards and compliance with standards; improved market infrastructure; expanded agricultural growth zones or corridors; and strengthened trade negotiation capacity.

vi) Enhanced resilience to climate change and improved risk management: This program is designed to increase the resilience of agricultural producers and the overall sector through subprograms to improve climate early warning and response systems; mainstream climate change and risk management approaches; strengthen climate change negotiation capacity; improve natural resource management; and strengthen disaster risk reduction and management.

vii) Strengthening continental coordination, partnerships, and mutual accountability for strategic results: This program is designed to support the Malabo Declaration commitment to mutual accountability to actions and results, through subprograms to improve strategic knowledge management and scaling up; enhanced strategic

communication and advocacy; strengthened coordination at the country, regional and continental levels; improved accountability, biennial reviews, and monitoring and evaluation and reporting systems at the continental level; and strengthened leadership and political engagement for CAADP implementation.

It is ultimately the responsibility of African countries to implement policies and investments that will result in achievement of the CAADP and Malabo goals; the Business Plan guides the provision of African Union leadership and services to countries and regional economic communities to better enable them to implement the required actions. Assistance from the African Union includes the development and sharing of strategic frameworks, tools, and good practices; provision of capacity strengthening; assistance with implementation of strategies; and opportunities for sharing experiences and lessons among countries and regional economic communities. The Business Plan clearly identifies African priorities for development cooperation to achieve the agricultural transformation goals outlined in the Malabo Declaration. The seven programs of the Business Plan also correspond to areas in which investments at the country and regional level are needed to achieve Africa's shared development goals. With understanding of Africa's needs and its own agricultural development plans, it will be easier to identify flagships for the China-Africa Agricultural Modernization Program. Specific locations and value chains should be identified as potential flagship programs for agricultural modernization and focal points for future Chinese development cooperation in Africa. And in designing flagship programs, smallholder farmers' interests and needs should be taken into consideration.

4.3. Identify Priority Investment Areas Based on Local Needs

Determining specific investment areas for China's agricultural development cooperation requires a process of scientific justification that includes the identification of priorities at the country or regional level and analysis of the applicability of China's lessons and technical expertise. Options for China's investment could include providing funding or technical assistance to support subprograms of the AU Business Plan, or elements of NAIPs for a set of countries. These possibilities would have the advantage of ensuring alignment with Africa's priorities and local strategies.

For southern Africa, where food staple grains contribute substantially to agricultural growth, it is important to increase grain productivity in order to reduce imports and lower prices to benefit rural and urban consumers, especially considering the rapid increase in rice demand due to population growth. Output increases must be combined with investments in midstream value chain segments, including processing and storage, and links to feed and biofuels industries. Livestock, which faces growing demand and accounts for up to a quarter of agricultural growth in the middle-income countries of the region, is another critical area for investment, as well as millet and sorghum, given the importance of mixed crop-livestock production in the region. Investments to reduce the costs of fertilizer distribution and improve irrigation and water management are important complements to other efforts to raise crop and livestock productivity [54].

In Central and East Africa, simulations using IFPRI's Dynamic Research Evaluation for Management (DREAM) modeling software suggest that investments in agricultural R&D in a limited number of countries would have broad impacts across the region. In particular, technologies to improve productivity in maize, sorghum, coffee, and beef can create significant shared benefits [55]. These commodities represent potential priority areas for China's agricultural cooperation in the region.

Based on the increasing demand for rice in Africa, there is considerable potential in rice breeding cooperation; the promotion of Chinese hybrid rice technology in Africa could be a highlight of future China-Africa agricultural modernization cooperation. Population growth and urbanization, important trends in African countries, bring about surging demand for rice, which has become a staple food for many African urban residents. However, due to the low level of development of rice breeding and planting technology in African countries, current rice production in Africa is low and is failing to meet growing demand. Selecting high-yield varieties is expected to be an important way to improve rice production in Africa. China has an advantage in rice breeding, and the yield of Chinese hybrid rice has compared positively in tests of varieties in some countries in Africa, showing the immense potential of Chinese hybrid rice for improving food security in Africa. At the West Africa Agricultural Investment Symposium held in 2009, African agricultural experts recommended promoting Chinese hybrid rice technology to increase rice production and ensure food security. And at the China-Africa Agricultural Cooperation Forum held in August 2010, representatives of African countries expressed the need for China to continue to transfer agricultural technology in Africa. The demand for rice yield increase in Africa combined with the technological advantages of hybrid rice in China offers an effective way to strength the cooperation between China and Africa in rice breeding technology, screening and promoting rice varieties suitable for African growing conditions, and eventually contribute to increasing Africa's food security and reducing hunger. A recent IFPRI study shows that if the adoption rate of Chinese hybrid rice reaches 20% or 50% in Africa south of the Sahara, with irrigation projects being strengthened in the meanwhile, this region is likely to achieve rice self-sufficiency and even turn net exporter of rice by 2036 or 2030 respectively, and the trade surplus will continue to expand[56].

There is growing interest in Africa in intensive, site-specific agricultural investments, and several countries are implementing or planning agricultural business parks, including the DRC, Senegal, and Ethiopia. Given the overlap between Africa's interest and China's experience and expertise, China-Africa agricultural industrial parks may have the potential to become a flagship program of Chinese-African agricultural cooperation, depending on local demand. Developing modern agricultural industrial parks is an important way for China to promote agricultural supply-side reform and accelerate agricultural modernization [57]. It also represents a new trend in the development of China-Africa economic cooperation. The development of China-Africa agricultural industrial parks could promote China-Africa agricultural modernization cooperation from the technical level to the institutional level, integrating China's technology, fertilizer, machinery, investment and market resources and benefiting agricultural industrialization in Africa at the same time.

China has piloted agricultural industrial parks in some African countries including Uganda, Tanzania and Togo, though impacts have yet to be seen. China has yet to carry out large-scale and systematic practices in Africa over a long term, and impact evaluation of China's domestic agricultural industrial parks is relatively weak. That poses challenges to the international extension of such practice, including introducing the industrial parks to Africa. Given these obstacles, it should be noted that cooperative agricultural industrial parks have potential to draw on the advantages of both sides, providing opportunities for local businesses, extending agricultural value chain, and incentivizing investment and trade. In promoting China-Africa agricultural industrial parks, it is important to strengthen research, planning and assessment. It is also necessary to identify appropriate locations and potential industrial direction, as basic infrastructure like electricity could be a fundamental prerequisite to the successful operation of an industrial park. Provide policy supports such as market access and preferential tariffs, based on the characteristics and needs of agricultural development in Africa may be pivotal. At the same time, the operation of agricultural industrial parks is supposed to incorporate the concept of community, building closer links with local people and local society. Finally, assessment needs to be done to evaluate the effectiveness of these projects. Good practices should be summarized, and lessons need to be learned, making the demonstration of agricultural industrial parks a source of momentum for the development of agricultural industry in Africa.

4.4. Promote Knowledge Sharing of China's Good Development Practices

Traditionally an agricultural country, China has gained rich knowledge and experience in agricultural development. As the largest developing country, it shares some familiar challenges with Africa in terms of technology, food security, and socioeconomic development [59]. China has successfully carried out economic transformation, and greatly progressed in economic growth and poverty reduction, turning from a food recipient country to a food donor. In terms of international development, China's experience differs from the Western development model and is increasingly accepted by the international community. China gave top priority to agricultural development, leading to pro-poor economic growth. This strategy may provide a model for African countries, which have shown great interest and enthusiasm for learning from China. And despite significant differences between the Chinese and African contexts, Africa's agriculture-based countries could learn a great deal from China not only in terms of agricultural technology but also development policy.

However, China's good practices have not yet been widely promoted and implemented in Africa. This is partially due to China's limited evaluation of its agricultural and rural development. An important part of future China-Africa agricultural cooperation support for studies to summarize and extract China's experiences in agricultural and rural development, especially in agricultural modernization. The transformation of China's overall economy and society was only possible because of the equally remarkable agricultural growth, its agricultural and rural transformation, and the sequencing of transformation policies. This was realized under diverse regional agro-ecological conditions and was made possible in no small part by several coordinated efforts and gradual policy reform and investment. Several key

lessons for African policymakers need to be identified and closely looked at by researchers from China, Africa, and international research institute, including providing incentives and markets for farmers, investment in agricultural technology and infrastructure, effective incentives for the promotion of local agricultural growth and transformation, and sequencing of institutional and policy reforms. Because Africa is undergoing very rapid change, successful development strategies are likely to differ from those that have been attempted previously. Areas of overlap between the gaps and potentialities in Africa and the applicable lessons from China need to be identified, considering Africa's current trends as well as similarities and differences between African countries' agro-ecological characteristics and development stages and those of China's regions.

However, the lack of effective knowledge-sharing methods appropriate for Africa has also hindered knowledge sharing. A clear barrier is Africa's underdeveloped knowledge-sharing platforms and channels. Therefore, another crucial step is to identify practical means of communication most applicable to agricultural development in Africa based on sound evidence and research. Based on technical cooperation, China-Africa agricultural cooperation should be expanded to policy and institutional dialogue and sharing and pay more attention to community development in Africa. Innovation in approaches to knowledge sharing is also important to effectively disseminate Chinese experience in Africa.

4.5. Improve Commercial Operation for Better Sustainability

The lack of sustainability in previous China-Africa agricultural cooperation practices has become a major bottleneck in deepening cooperation to promote self-driven development in Africa. China-Africa ATDCs, as is the case, rarely achieve successful commercial operation after the termination of government funding. Though the disadvantageous policy, market, and institutional context in Africa are challenging, lessons could be learned and measures taken to increase sustainability. First, private sector participation should be strengthened. In previous agricultural cooperation practices, especially in terms of aid and investment, the government and state-owned enterprises usually played a predominant role and participation of private sector was comparatively insignificant. However, state-owned enterprises have limitations in terms of business mechanisms, failing to connect to local markets effectively. Private enterprises, especially those with experience working in Africa, should play a more important role in technology transfer and extension by incorporating it into efficient commercial operations. An increase in agricultural investment from the private sector is expected to promote sustainability of technology assistance, and participation of private enterprises could also benefit local smallholder farmers by connecting them with contracts or employment opportunities. African and Chinese governments, however, should highlight their role in offering support to the enterprises, including building platforms for information and knowledge sharing, providing public goods and services, and guaranteeing orderly participation.

4.6. Strengthen Trilateral Cooperation with Various Partners

China-Africa agricultural cooperation currently focuses on bilateral cooperation. However, the potential and advantages of trilateral cooperation are evident from South-South cooperation under the FAO framework, the China–Bill & Melinda Gates Foundation-Africa program, the China-CGIAR-Africa program, and the China-UK-Africa agricultural technology transfer project. Trilateral cooperation can help integrate resources from multiple parties, promote knowledge and experience sharing among international, nonprofit organizations and developed countries, improve the effectiveness of aid resources, and strengthen the capacity of Chinese aid agencies. From the perspective of China, it is particularly important to formulate policies for guiding future trilateral cooperation for agricultural development in Africa. In the past practice, several Chinese ministries often participated in the management and coordination of trilateral partnerships for a particular issue, resulting in miscommunication and causing confusion to the partner countries or organizations. The department in charge of international cooperation should develop clear policies to guide trilateral cooperation. The top goal of such policies should be clarifying the direction, objectives, and design of the cooperation, guiding all the participating departments. It is also necessary to specify the partners, development areas, project management procedures, and financial supports, so that trilateral cooperation can be based on evidence and have clear path.

As South-South cooperation becomes part of the agenda of international aid, trilateral partnership among traditional donors, emerging donors, and recipient countries is a useful way forward [24]. In addition to international organizations such as UNDP, WFP, FAO, IFAD, and CGIAR, China-Africa agricultural modernization cooperation could also benefit from the participation of partners in South-South cooperation, other bilateral development agencies, and NGOs. NGOs can help maximize the effectiveness of China-Africa agricultural modernization cooperation through learning from countries of the global south that are at a similar development stage and using more international resources. In future cooperation, new partnerships could be built to support better implementation of China’s assistance packages for facilitating Africa’s agricultural modernization. Chinese partner institutes’ participation makes it easier to incorporate lessons from China’s experience of translating its agriculture into a modern, productive sector offering better rural livelihoods. Partnerships would also benefit from the local partners’ convening power in Africa; and the participation of other partners will bring experience, expertise and other resources, contributing to the efficient use of China’s funding to Africa and helping create more effective Sino-Africa agricultural investments and projects, thus promoting agricultural modernization and rural development in Africa.

4.7. Promote Third-Party Impact Evaluation and Dissemination

In addition to the implementation of cooperative projects, China-Africa agricultural modernization cooperation should be evaluated independently, and results disseminated to the development partners and media outlets. Chinese scholars need to be encouraged to conduct relevant research on China-Africa agricultural modernization cooperation, evaluate the impact of existing cooperative projects, and provide solid evidence for communications and shaping international public opinion. Based on sound research, China can respond to the criticism in international media and, when unfounded, take measures to reduce their potentially negative impact [58].

China should also encourage the participation of the international community, especially third-party international organizations and NGOs. These can assess the impacts of China-Africa agricultural projects and ensure that practices of the projects are in line with domestic and international regulations on environmental protection and sustainability.

Finally, Chinese media should play a more active role in communication by promoting their overseas branches and their presence abroad. They should also partner with third-party agencies to tell the evidence-based stories of China-Africa agricultural cooperation. Xinhua News Agency and China Central Television can take the lead. However, they are usually viewed as “official media,” which to some extent reduces the effectiveness of their efforts in overseas communications. Thus, diverse media and agencies should be encouraged to participate in communicating China’s overseas development effectiveness.

5. Conclusion

Africa continues to face serious hunger and poverty problems. At the same time, it has considerable potential for agricultural development, with the largest area of uncultivated arable land in the world. African agriculture has grown steadily with the region's rapid economic transformation in recent years, but its agricultural productivity remains low and there are certain challenges to be overcome for better food security and agricultural development, calling for more international resources, technology, and development lessons. While international investments in African agriculture are relatively small, growing China-Africa agricultural cooperation has attracted increasing attention. Such cooperation has potential, given the complementarity of Chinese and African agricultural resource endowments and support from the Forum on China-Africa Cooperation and the China-Africa Agricultural Modernization Program as one of ten key cooperation areas. To advance China-Africa agricultural modernization cooperation, several challenges from earlier China-Africa agricultural cooperation activities need to be addressed. Limited strategic planning and coordination, predominance of technical-level cooperation, and absence of engagement in policy dialogue, as well as the potential gap between China's experience and resources versus the local needs of Africa's agricultural development, are among the major challenges. Cooperation has also been impeded by language and cultural barriers, as well as pressure from negative global public opinion.

To address these challenges, it is necessary to formulate an integrated strategic plan to guide the future development of China-Africa agricultural modernization cooperation. The recent institutional reform in China and its newly established international development cooperation agency provide a good opportunity for the institutionalization of China-Africa agricultural modernization cooperation. Such a strategic plan is expected to guide and align Chinese investments and collaborative activities with key development efforts by African Union member states. The plan should connect China's agricultural development assistance plan with Africa's own agricultural development plans and policies and work to enhance support to CAADP and the Africa Agenda 2063. In addition, several specific issues need to be considered during the development of such plan. Research and strategic planning should be given top priority and be based on policy dialogue, which can help communicate local needs of Africa's agricultural development. Lessons from China that are applicable to Africa need to be extracted through empirical studies. Furthermore, institutional coordination of Chinese interventions in Africa needs to be strengthened under the guidance of a coherent development assistance strategy. Broader and more diversified international cooperation should be promoted with support from international organizations, bilateral development agencies, and the private sector. And the resources and advantages of multiple parties should be integrated to promote Africa's agricultural and economic development, ensure its food security, and reduce poverty. Third-party impact evaluation should be conducted to improve the performance of China-Africa agricultural modernization cooperation projects.

References

[1] Badiane, O. and McMillan, M. (2014). *Economic transformation in Africa: Patterns, drivers, and implications for future growth strategies in beyond a middle-income Africa transforming African economies for sustained growth with rising employment and incomes*. Regional Strategic Analysis and Knowledge (ReSAKSS), International Food Policy Research Institute (IFPRI).

[2] Davis, B., Giuseppe, S. D., and Zeeza, A. (2016). Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa. *Food Policy*, 67 :153-174.

[3] Diao, X., Thurlow, J., Benin, S., and Fan, S. (2012). *Strategies and priorities for African agriculture: Economywide perspectives from country studies.* International Food Policy Research Institute (IFPRI).

[4] New Partnership for Africa's Development. (2013). Agriculture in Africa: Transformation and outlook. New Economic Partnership for Development (NEPAD).

[5] Chen, K., Hsu, C., and Fan, S. (2013). Steadying the ladder: China's agricultural and rural development engagement in Africa. *China Agricultural Economic Review*, 6 (1).

[6] United Nations Economic Commission for Africa (UNECA) and African Union Commission (AUC). (2012). *Economic Report on Africa: Unleashing Africa's potential as a pole of global growth*. Addis Ababa: UNECA, AUC.

[7] International Fund for Agriculture Development (IFAD). (2016). *Rural development report 2016: Fostering inclusive rural transformation.* Rome: IFAD.

[8] The Alliance for a Green Revolution in Africa (AGRA). (2017). *Africa agriculture status report 2017: The business of smallholder agriculture in Sub-Saharan Africa.* Nairobi: AGRA.

[9] Chen, K., Zhang, Y., & Wang, J. (2017). Status and technical demand of African agricultural research and development. *Interim report of China-Africa agricultural technology transfer mechanisms and impact*. Beijing: Center for International Agricultural Research (CIAR), Chinese Academy of Agricultural Science (CAAS).

[10] McMillan, M. and Rodrik, D. (2012). *Economic transformation in Africa.* Paper presented at Transforming Agriculture Conference. Accra: International Food Policy Research Institute (IFPRI).

[11] Badiane, O. (2014). Agriculture and structural transformation in Africa. In Falcon, W.P. and R.L. Naylor (eds.), *Frontiers in Food Policy: Perspectives on sub-Saharan Africa*. The Center on Food Security and the Environment, Stanford University. Stanford, CA: Printed by CreateSpace.

[12] Diao, X., Harttgen, K., and McMillan, M. (2017). The changing structure of Africa's economies. *The World Bank Economic Review*, 31(2): 412-433.

[13] African Center for Economic Transformation (ACET). (2017). *African transformation report 2017: Agriculture powering Africa's economic transformation.* ACET.

[14] FAO. (2016). Retrieved from FAO databases: http://www.fao.org/statistics/databases/zh/.

[15] Nin-Pratt, Alejandro., Johnson, M., Magalhes, E., You, L., Diao, X., and Chamberlin, J. (2015). *Yield gaps and potential agricultural growth in West and Central Africa*. Washington, D.C.: International Food Policy Research Institute (IFPRI).

[16] Beintema, N. and Stads, G-J. (2014). *Taking stock of national agricultural R&D capacity in Africa South of the Sahara*. Agricultural Science and Technology Index (ASTI) Synthesis Report, International Food Policy Research Institute (IFPRI).

[17] Benin, S. (2017). Agricultural public spending in Africa is low and inefficient. In reaping richer returns: Public spending priorities for African agriculture productivity growth. *Africa Development Forum Series.* Washington, D.C.: World Bank.

[18] International Food Policy Research Institute (IFPRI). (2016). *2016 Global Food Policy Report*. Washington, D.C.: IFPRI.

[19] FAO. (2017). *The State of Food Security and Nutrition in the World*. Retrieved from FAO website: http://www.fao.org/state-of-food-security-nutrition/en/

[20] IFPRI. (2018). *2018 Global Food Policy Report*. Washington, D.C.: IFPRI.

[21] OECD and FAO. (2016). *OECD-FAO Agricultural Outlook 2016-2025*. Paris: OECD.

[22] Lu, Y. (2018). *Problems and the way out.* China Investment, 6.

[23] The G8 Research Group. *2012 Camp David G8 Summit final compliance report.* (2013). The Munk School of Global Affairs at Trinity College in the University of Toronto.

[24] Chen, K., and Joshi, P. K. (2012). New players and South-South cooperation in development. *2011 IFPRI Global Food Policy Report.* Washington D.C.: International Food Policy Research Institute (IFPRI).

[25] The Chinese Academy of Agricultural Sciences(CAAS). (2018). *China Agricultural Sector Development Report*. Forthcoming.

[26] The World Bank. (2013). *Securing Africa's Land for Shared Prosperity: A Program to Scale up Reforms and Investments.* Washington, D.C: International Bank for Reconstruction and Development/ The World Bank.

[27] The Howard G. Foundation. (2015).*Africa's Potential for Agriculture*.: http://harvestingthepotential.org/brownrevolution/assets/africas_potential_for_agriculture.pdf

[28] Li, J. (2011). Status and future of China-Africa agricultural cooperation. *Compilation of cases of China-Africa international cooperation.* Beijing: International Poverty Reduction Center in China.

[29] Buckley, L. (2013). *Narratives of China-Africa cooperation for agricultural development: New paradigms.* Future Agricultures Consortium working paper.

[30] Sun, H. (2011). *China in Africa' research project report: Understanding China's agricultural investments in Africa*. The South African Institute of International Affairs.

[31] Wang, X. and Liu, Q. (2012). China-Africa cooperation: A new approach to improve development effectiveness. *Working Paper Series 5*. Beijing: International Poverty Reduction Center in China.

[32] Brautigam, S. and Tang, X. (2009). China's engagement in African agriculture: "Down to the countryside." *The China Quarterly,* 199: 686-706.

[33] Gabas, J-J. and Tang, X. (2014). Chinese agricultural cooperation in Sub-Saharan Africa: Challenging preconceptions. *Perspective*, 26.

[34] Kitano, N. and Harada, Y. (2016). Estimating China's foreign aid 2001-2013. J*ournal of International Development*, 28.

[35] *White paper on China's foreign aid.* (2014). Beijing: The State Council Information Office of the People's Republic of China.

[36] Lu, M. (2012). A research on Africa-Britain-China agricultural trilateral cooperation. *World Agriculture*, 404(12): 13-21.

[37] Yang, J., Li, W., Li, M., and Wang, X. (2012). *China-Africa agricultural trade trends, comparative advantages, and complementary analysis*. China Rural Economy, 3.

[38] Zhang, H. (2017). *A study of the VGGT and extraterritorial investments in agriculture in African countries by entities from China, India and South Africa*. Unpublished manuscript.

[39] White paper on *China-Africa economic and trade cooperation.* (2013). Beijing: The State Council Information Office of the People's Republic of China.

[40] Foreign Economic Cooperation Center (FECC), Chinese Ministry of Agriculture and Rural Affairs (MARA). (2018).

[41] Ministry of Commerce of the People's Republic of China. (2015). *FOCAC Johannesburg Summit and the 6th Ministerial Conference Interpretation of the Economic and Trade Fields of the "Top Ten Cooperation Programs."*

[42] Chen, K. and Zhou, Y. (2018). *An Africa-Britain-China trilateral cooperation in agriculture*. Case Study. Submitted to the School of Global Value Chain, University of International Business and Economics.

[43] Bill & Melinda Gates Foundation (BMGF). (2018). Basic situation of the ongoing trilateral agricultural cooperation projects of China, Africa and Gates Foundation. Information sheet.

[44] Brautigam, D. and Tang, X. (2012). *An overview of Chinese agricultural and rural engagement in Tanzania.* Washington, D.C.: International Food Policy Research Institute (IFPRI).

[45] Hong, J. (2017). China and Africa will promote the consolidation of agricultural cooperation and strengthen the transformation of scientific results. Retrieved from China News: http://www.scagri.gov.cn/ywdt/hydt/201712/t20171211_524634.html

[46] Tang, L. and Li, X. (2017). Historical narration of aid: Logics of agricultural aid to Africa. *Demonstration of new development: Narratives of China's agricultural technology demonstration centres in Africa.* Beijing： Social Sciences Academic Press (China).

[47] Chen, T. (2018). The seminar of China-Africa agricultural research institutions 10+10 cooperation held in Haikou. Retrieved from the Department of International Cooperation of CAAS: http://gh.caas.cn/hzdt/126661.htm

[48] Zhang, Y. and Li, X. (2017). Sharing of parallel experiences: Learning of aid based on construction and embedding. *Demonstration of new development: Narratives of China's agricultural technology demonstration centres in Africa.* Beijing： Social Sciences Academic Press (China).

[49] Chichava, S. (2014). *Chinese agricultural investment in Mozambique: The case of the Wanbao rice farm.* SAIS-CARI Conference.

[50] Smith, D. (2009). The food rush: Rising demand in China and west sparks African land grab. Retrieved from the Guardian: https://www.theguardian.com/environment/2009/jul/03/africa-land-grab.

[51] Brautigan, D. (2015). *Will Africa feed China.* New York: Oxford University Press.

[52] Maiyo, J. (2014). *The political ecology of Chinese agriculture investment in Uganda: The case of Hanhe farm*. SAIS-CARI Conference.

[53] African Union. (2017). *Business Plan for Implementation of the CAADP-Malabo Declaration (2017–2021). Volume 1: Main Text.* February 23, 2017. Addis Ababa: African Union.

[54] Johnson, M., Benin, S., You, L., Diao, X., Chilonda, P., and Kennedy, A. (2014). *Exploring strategic priorities for regional agricultural research and development investments in Southern Africa*. Washington, DC: International Food Policy Research Institute (IFPRI).

[55] You, L., and Johnson, M. (2008). *Exploring strategic priorities for regional agricultural R&D investments in East and Central Africa*. Washington, DC: International Food Policy Research Institute (IFPRI).

[56] Wang, J., Zhang, Y., Chen, K., and Nie, F. *Impact of Transferring Chinese Hybrid Rice to Africa.* Report submitted to the Center for International Agricultural Research, Chinese Academy of Agricultural Science.

[57] *Notification of the establishment of the national modern agricultural industrial park.* (2017). Ministry of Agriculture and Rural Affairs of People's republic of China, Ministry of Finance of People's republic of China.

[58] Buckley, L., Chen, R., Yin, Y., and Zhu, Z. (2017). *Chinese agriculture in Africa perspectives of Chinese agronomists on agricultural aid.* Unpublished Paper.

[59] Long, G. (2013). Rethinking the legacy of African colonialism. *History Research*, 5.

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