Financial Inclusion and Energy Poverty Nexus: Evidence from Pakistan

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Abstract

The purpose of this study is to look at the connection between financial inclusion and energy poverty in Pakistan. The data in the time series covers the years 1990–2022. Two econometric techniques that we used to look at the relationship between the variables were unit root testing and the ARDL model. The findings demonstrate that financial inclusion reduces Pakistan's energy poverty. The study's answers agree a few policy recommendations that might be used in upcoming policymaking. The results show that financial institution expansion, depth, accessibility, and overall effectiveness have a significant beneficial impact on economic growth in both the full sample and subsamples. We also find that in these sections, trade openness, labor, capital, and energy consumption all have a substantial impact on economic growth. Moreover, older, or lower-income nations benefit more from financial inclusion in terms of economic production.

Keywords: Financial Inclusion, Energy Poverty, ARDL.

Introduction

In Pakistan, a nation of nearly 220 million people, poverty is a major problem. According to recent research, enhancing the poor's access to financial services may help them live better (Fadun, 2014). With a population of around 220 million, poverty is a significant issue in Pakistan. Improving the impoverisher's access to financial services may improve their quality of life, according to recent research. Lack of energy can reduce the value of human life for a variety of reasons. Due to their inability to complete their work hours, these individuals are significantly more likely to experience EP difficulties. Similarly, women without access to clean energy are more likely to become sick since they have to use risky energy sources for heating and cooking (Zhang et al., 2022).

By providing everyone with affordable financial services, improving their standard of living, and decreasing the financial sector—which is Evident in the accessibility of supplementary financial services—financial inclusion can help combat poverty. It is still debatable how finance and economy are related to growth. Economists argue that finance responds to needs from the real sector, not the other way around (Zhang et al., 2021).Because of the narrow character of the connection between financial development and EP, further experimental research is required in order to offer a thorough comprehension of this relationship. Due to a limited number of developing economies, the previous study was insufficient (Wen et al., 2021).We believe that including additional economies might help our trial results be more consistent and straightforward.

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Financial inclusion is becoming more and more popular worldwide because of its importance in assisting the financial sector.

The World Bank emphasizes that in order to achieve equitable economic growth and lower poverty, there must be universal access to financial services by 2020. Even if there is potential for growth in demand-side indicators in populous nations like Bangladesh, Pakistan, and India, strategies generally focus on supply-side metrics. This investigation's primary goal was to determine how Pakistan's GDP growth rate affected the country's poverty rate. To calculate the impact, the Growth Elasticity of Poverty tool was employed. Once more, prospects for the highly less elastic, i.e., a significant shift in poverty, are diminished by increased unemployment. Government policy failure, the global recession, and the underprivileged class were deemed to be the primary causes of the frightening state of affairs in the nation (Shittu, 2012).

Literature Review

The timely provision of financial services to those from disadvantaged social backgrounds is known as financial inclusion. as mentioned by Ramji (2009). Availability of numerous official financial facilities, ranging from straightforward credit and money possibilities to more intricate choices like insurance and pensions, is guaranteed by financial inclusion. Moreover, financial inclusion guarantees that clients can choose from a large range of reasonably priced financial service providers. Financial institutions, pension fund managers, leasing companies, insurance providers, and other support services like fund management, security broking, and financial markets administration are examples of financial services that include the provision of financial intermediation by financial services companies (FSFs) (Fadun, 2013).

In a more recent study, Anwar et al. (2017) used a cross-country regression analysis to examine the association between the extension of the commercial industry and the decrease in poverty. Their findings demonstrated the essential character that a strong and effective commercial area can tragedy in accomplishing this goal, showing found the decline in poverty was positively and statistically correlated with the expansion of the financial industry. Overall, the study's conclusions imply that the growth of the banking industry and greater financial inclusion can take had a weighty positive impression on the battle against poverty. To look into how Pakistan's growing banking sector affects the nation's efforts to fight poverty (Ali et al., 2022). Their findings demonstrated the critical role that a robust and well-functioning financial sector may play in accomplishing this aim, as they demonstrated that the reduction in poverty was positively and statistically significantly impacted by the expansion of the banking industry. Pakistan's efforts to combat poverty may have benefited greatly from the financial sector's growth and increased financial inclusion, according to the study's overall conclusions. In order to support financial inclusion and the growth of the nations, financial sector, further investigation is required to comprehend the ways in which these aspects contribute to the eradication of poverty.

They contend that the growth of financial institutions, capital accumulation, and effective financial intermediation all contribute to the expansion of economic activity. The development of corporate structures, financial reporting and procedures, financial instruments, and the expansion of the financial industry as a whole are all examples of financial innovation. Four main categories of causal hypotheses have been put out to explain the connection between financial innovation and economic growth based on the empirical data that is now available. The supply leading theory, which was first put forth by Shittu (2012), contends that financial innovation promotes economic growth by reducing trade barriers, lending money for growth, making financial services more accessible, and streamlining the client-facing operations of financial institutions.

However, a number of scholars worked hard to show how financial innovation and economic growth are related, and they were able to provide strong evidence to back up this theory (Qamruzzaman & Jianguo, 2018; Bouzarovski & Petrova, 2015).

Santomauro et al. (2020) study, which encompassed 176 countries, further contributed to our understanding of the link between poverty and inclusion by looking at the factors influencing financial inclusion and evaluating how this inclusion impacts income disparities and poverty globally. Their empirical study shows that, even in a subsample of emerging Asian nations, factors like per capita income, the rule of law, and demography have an influence on the global inclusion movement. Examining whether financial inclusion lessened poverty and income inequality was the focus of the study's second half. The results indicate a strong positive link between lower rates of income inequality, financial inclusion, and poverty; however, this correlation becomes less pronounced when taking the Asian subsample into consideration. Using data from 1973 to 2004, Nguyen et al. (2021) conducted a second study on Indian states in which the generalized methods of moments were used to investigate how financial inclusion affects poverty. The poverty ratio and it have a substantial negative association, according to the results. The authors discovered that when taking into account the depth and breadth of finance, they work in concert to reduce poverty in the nation.

The impact of fluctuating energy costs and the significance of energy have been recognized by academics and decision-makers. The idea of energy poverty, which is novel and significant in this context together with energy security (Park & Mercado, 2018). A lot of debate surrounds the concept of "energy poverty". The causes of energy poverty and the contribution of energy prosperity to the development of emerging countries have been the subject of some recent research. For example, Nguyen et al. (2021) shown that financial growth lowers energy poverty in a sample of 65 economies. An increasing number of articles on the subjects of energy efficiency and green finance have been noted by the author. Green finance facilitates investments in energy initiatives and encourages the creation of a green economy (Polat et al., 2020). In the context of the World Energy Outlook, meeting the growing demand for energy while simultaneously reducing carbon emissions has been identified as a challenge. The residential, transportation, and industrial sectors are the top energy consumers, according to the International Energy Agency. As a result, energy efficiency is very important, and advancements in it have the potential to drastically reduce both emissions of CO2 and energy utilization. In addition, several countries have enacted legislation to increase energy efficiency (Park & Mercado, 2021).

The study's findings demonstrate that utilizing non-renewable energy lowers carbon emissions. Anwar et al. (2021) investigated the relationship between energy consumption and carbon emission levels in the ASEAN countries between 1990 and 2018, using the FMOLS, DOLS, and FE-OLS methodologies. The information that was available indicated that the EKC hypothesis was true in each case. Furthermore, the outcomes showed that the usage of non-renewable energy has a favorable impact on carbon emission levels. Several research works have indicated the significant influence of financial inclusion on economic indicators. In this context, Sharma (2015) used vector auto-regression (V.A.R.) models; the findings showed that the variables measuring financial inclusion and economic growth were positively correlated. Santomauro et al. (2021) used a regression model to look at the relationship between financial inclusion and Zimbabwe's economic development between 2011 and 2017. Despite the evident theoretical connections between financial development and EP, there is still a dearth of empirical study on this relationship, much of which is limited to studies that focus on a single nation (see table 1). Wen et al. (2021)

for instance, looked into the connection between financial inclusion and EP in the Ghanaian setting.

Factor analysis was used to establish the weighting scheme for the new composite index, which more accurately reflects the involvement of every dimension and adjustable to the index overall. Financial integration's (FI) macroeconomic effects have been connected to indicators of overall financial and economic stability, poverty, and inequality in addition to economic growth. According to the report, Zimbabwe's financial development improves as a result of financial inclusion. Literature examined the relationships between financial inclusion and economic development, financial stability, poverty, and income inequality in eleven developing Asian countries between 2009 and 2018. The study used G.M.M. techniques. On the other hand, the cost obstacle to energy-based production is lessened on the supply side by advancements in the banking sector (Nguyen et al., 2021). In fact, manufacturers have easy access to energy services because of the expansion of the financial sector, which has made credits, loans, and investment opportunities readily available (Park & Mercado, 2018).

Anwar et al. (2017) showed comparable outcomes by constructing the FI index for SAARC countries—apart from the Maldives—using the three-dimensional model developed by (Sharma, 2008). This derived index has shown that South Asia's FI, when compared to other continents, is still low, with notable regional variations in results. India and Bhutan scored higher than other SAARC nations, while Afghanistan and Pakistan had the lowest FI.

Methodology

The main objective of this research is to understand, with the use of data from Pakistan, the relationship between energy poverty and financial inclusion. Based on data from Pakistan, a quantitative method has been utilized to investigate the degree of financial inclusion and the effects of energy poverty to determine its relevance. EP: The inability to obtain power or the use of environmentally dangerous and ineffective technology for burning solid biomass are the two main ways that energy poverty is characterized in the field of energy studies. When people and organizations have access to priced financial services and commodities that fulfill their requirements and are provided in a way that is realistically beneficial, ethical, and sustainable, it is known as financial inclusion (FI) (transaction, payments, savings, credit, and insurance). GDP per capita is calculated by dividing the total gross value of all resident producers' contributions to the economy, less any subsidies, by the population at the midway point of the year. Additional taxes are applied to commodities that are not included in the output value. INF: The amount that a collection of products and services' prices have grown over a specific time typically a year is known as inflation. Probably one of the most well-known words in economics is this one. Inflation has caused extended periods of instability in certain countries. This is known by the abbreviation Autoregressive Distributed Lag, or ARDL. Econometric time series analysis uses this modeling technique. The ARDL model analyzes the relationship between variables across time, considering both short- and long-term effects.

Model Specification

Economic Model

$$EP = f(FI, FD, GDP, INF) \quad \ldots\ldots(1)$$

Econometric Model:

$$LEP_t = \beta 1 + \beta 2\ LFIt + \beta 3\ LFD_t + \beta 4\ LGDP_t + \beta 5\ LINF_t + e_t \quad \ldots\ldots(2)$$

Results and Discussion

Before going further, we first check the descriptive statistics of the data. It includes the mean, median, and Jarque-Bera test and their probabilities. The results of the descriptive statistics are shown in table 1.

Table 1: Results of Descriptive Statistics

	LEP	LFI	LFD	LGDP	LINF
Mean	3.09E-16	-0.816129	-0.218483	6.871756	1.882909
Median	-0.212090	-1.443000	0.107284	6.919864	2.007492
Maximum	2.901688	2.569358	1.751070	7.390640	3.009937
Minimum	-3.172851	-3.309233	-2.662624	6.041879	0.927954
Std. Dev.	2.041184	2.302932	1.232175	0.399976	0.561480
Skewness	-0.086448	0.317710	-0.821293	-0.645188	0.004103
Kurtosis	1.579818	1.422810	2.814268	2.394147	2.085785
Jarque-Bera	1.961527	2.770814	2.618727	1.947458	0.801029
Probability	0.375025	0.250222	0.269992	0.377672	0.669975
Sum	6.22E-15	-18.77097	-5.025098	158.0504	43.30691
Sum Sq. Dev.	91.66154	116.6769	33.40160	3.519580	6.935726
Observations	23	23	23	23	23

After that, we look at the correlation matrix, and the findings indicate that the independent variables do not have any correlation so there is no problem of Multicollinearity. We continued to the next phase.

Table 2: Results of Correlation analysis

	LEP	LFI	LFD	LGDP	LINF
LEP	1				
LFI	0.9658	1			
LFD	0.5448	0.5545	1		
LGDP	0.9525	0.8699	0.5058	1	
LINF	0.2135	0.0444	0.3706	0.2578	1

The degree of stationary between the variables was then evaluated using the unit root test. The outcomes of the ADF and PP tests are displayed in Table 3. At the level of the findings, the data is non-stationary, but at the first difference, it begins to be Significant.

Table 3: Results of Unit Root Test

Variables	Results of ADF		Results of PP	
	Level	**1st difference**	**level**	**1st difference**
LEP	0.8243	0.0007	0.8198	0.0007
LFI	0.9830	0.0242	0.9721	0.0232
LFD	0.5204	0.0027	0.4257	0.0005
LGDP	0.1947	0.0012	0.0059	0.0012
LINF	0.3443	0.0006	0.3352	0.0006

Note: All the value in the above table is probabilities.

We proceed to the next test after reviewing the unit root results. The ARDL test results are shown in table 4. According to this table, energy poverty drops by 1% for every 1% increase in the financial inclusion coefficient. The banking industry's investments have the impact of lowering Pakistan's poverty rate. Energy poverty has a similar link to the other variables. The ARDL bound test is the second test we do, and its purpose is to verify long-term partnerships.

Table 4: Dynamic ARDL Results

Variable	Coefficient	Std Error	t-stat	p-value
	-16.23552	4.945310	-3.283014	0.0095
LEP(-1)	0.251054	0.221752	1.132141	0.2868
DLEP(-1)	0.301932	0.111395	2.710458	0.0240
LFI	0.227375	0.139770	1.626776	0.1382
DLFI	0.227375	0.079099	2.874564	0.0183
LFD	-0.068560	0.041308	-1.659753	0.1313
LGDP	0.946697	0.442143	2.141159	0.0609
DLGDP	0.946697	0.196467	4.818607	0.0009
LINF	0.107862	0.081341	1.326048	0.2175
DLINF	0.107862	0.052407	2.058157	0.0697
CointEq(-1)*	-0.368977	0.028407	-12.98907	0.0000
R-squared	0.799780	Mean dependent var		0.288672
Adjusted R-squared	0.713972	S.D. dependent var		0.184146

Table 5 shows the results of the components' long-term relationship. The F-statistics value is larger than the upper and lower bonds, according to the data.

Table 5: Results of bond test

Value of F statistics	Lower Bond	Upper Bond
8.750	2.2	3.09
	2.56	3.49
	2.88	3.87
	3.29	4.37

The findings of VIF, which display the coefficient of EP and other variables, are displayed in Table 6. We next go to the following phase, which is to review the diagnostic tests.

Table 6: Results of VIF

Variable	Coefficient	Un centered	Centered
LFI	0.001973	6.629356	5.859952
LFD	0.002107	1.849886	1.791017
LGDP	0.058682	1627.455	5.256920
LINF	0.008749	19.70302	1.544493

To verify the heterosecdascity issue in the data, we employ various methods. We used the Harvey and Breusch-Pegan tests to examine the heterosecdascity issue in the data. We then proceed to the normality test to determine whether or not the data is regularly distributed.

Table 7: Results of Diagnostic Tests		
Diagnostic test Statistics	**P values**	**Results**
Heterosecdascity (Breusch-Pagan-Godfrey)	0.5481	No problem of Heterosecdascity
Heterosecdascity (Harvey)	0.6845	No problem of Heterosecdascity
Serial correlation (Breusch-Godfrey Serial Correlation LM Test)	0.2542	No serial correlation
Normality test (Jarque Bera)	0.961862	Distribution of data is normal

Table 7 shows the data distribution as it is usually found. The graph was produced by using the e-views source. We further confirmed the data's normality using the CUSUM and CUSUM of Squares tests. Graphs are also included in table 8.

Figure 1: Residuals

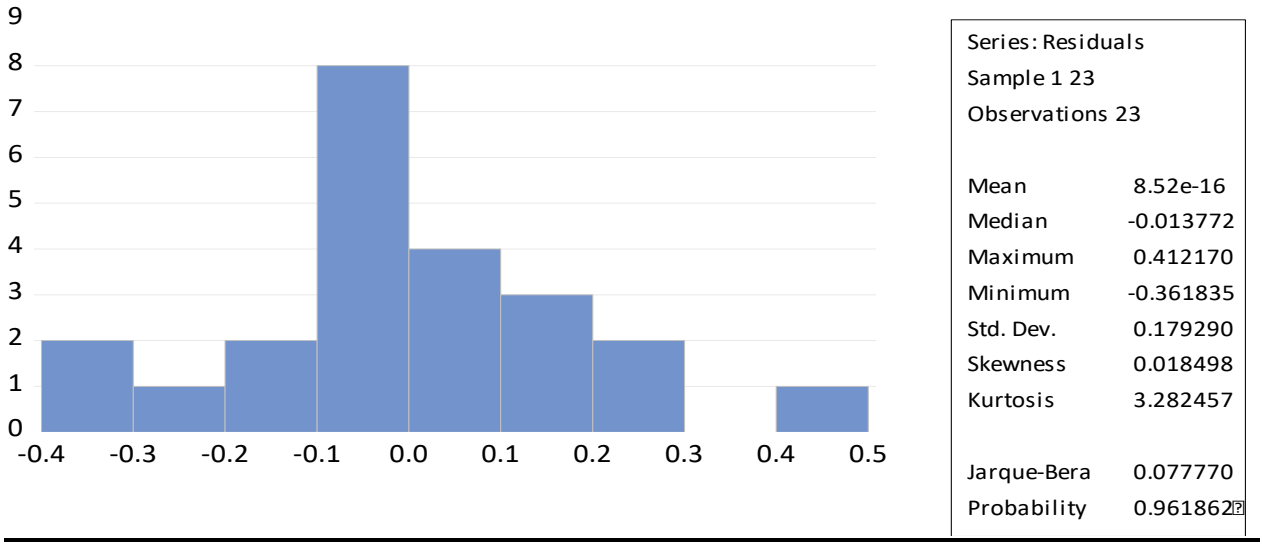
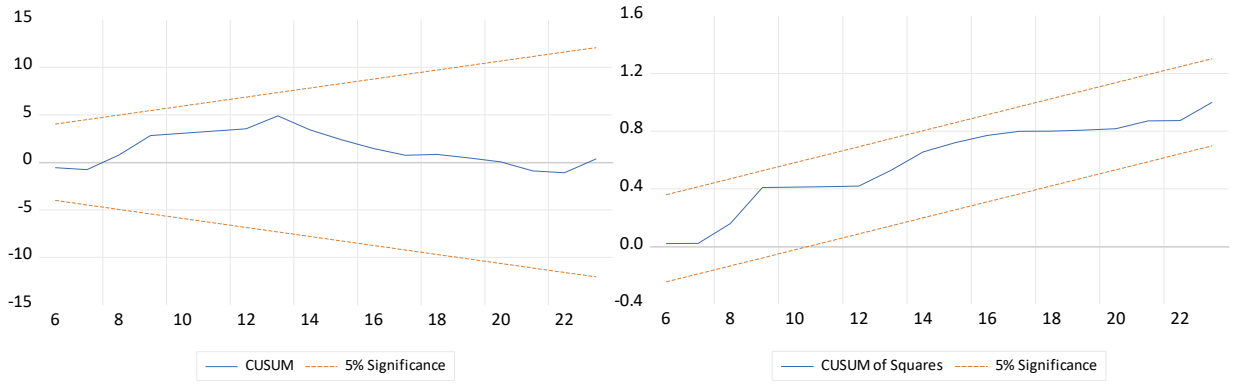


Figure 2: Cusum and Cusum Square



Conclusion and Policymaking

One strategy for reducing poverty and redistributing resources in emerging nations is financial inclusion. This has taken into account expanding credit availability, which helps to improve

malware for the underprivileged and boosts financial transactions that result in the accumulation of capital, the distribution of income, and fluid consumption. By analyzing the relationship between financial inclusion, financial sector development, and poverty reduction in that nation, this research aims to better understand the potential contribution of the financial sector to the reduction of poverty in Pakistan and to inform policy decisions concerning financial inclusion in that country. Services including risk management, saving, and capital allocation mobilization are offered by the financial sector and serve an economic loop role. He focusses of recent study has been on how financial services assessments could help the underprivileged. Growth in the financial sector can encourage improvements to better financial services, instruments, and institutions, or vice versa, which will lead to innovations in the financial system.

References

- Al Ali, H., Arkani-Hamed, N., Banta, I., Benevedes, S., Buttazzo, D., Cai, T., & Wang, M. (2022). The muon smasher's guide. *Reports on Progress in Physics*, *85*(8), 084201.
- Anwar, S., Akbar, R., Akbar, M. W., & Azhar, A. (2017). Measuring the size of underground Economy in Pakistan: A microeconomic approach. *Journal of Applied Environmental and Biological Sciences*, *7*(8), 84-93.
- Bouzarovski, S., & Petrova, S. (2015). A global perspective on domestic energy deprivation: Overcoming the energy poverty–fuel poverty binary. *Energy Research & Social Science*, *10*, 31-40.
- Fadun, S. O. (2014). Financial inclusion, tool for poverty alleviation and income redistribution in developing countries: Evidences from Nigeria. *Academic Research International*, *5*(3), 137.
- Hashimoto, T., Inoue, A. K., Mawatari, K., Tamura, Y., Matsuo, H., Furusawa, H., & Watson, D. (2019). Big Three Dragons: A z= 7.15 Lyman-break galaxy detected in [O iii] 88 μm,[C ii] 158 μm, and dust continuum with ALMA. *Publications of the Astronomical Society of Japan*, *71*(4), 71.
- Kaura, V., Durga Prasad, C. S., & Sharma, S. (2015). Service quality, service convenience, price and fairness, customer loyalty, and the mediating role of customer satisfaction. *International journal of bank marketing*, *33*(4), 404-422.
- Koomson, I., & Danquah, M. (2021). Financial inclusion and energy poverty: Empirical evidence from Ghana. *Energy economics*, *94*, 105085.
- Kubule, A., Ločmelis, K., & Blumberga, D. (2020). Analysis of the results of national energy audit program in Latvia. *Energy*, *202*, 117679.COVID-19 pandemic. *The Lancet*, *398*(10312), 1700-1712.
- Nguyen, C. P., Su, T. D., Bui, T. D., Dang, V. T. B., & Nguyen, B. Q. (2021). Financial development and energy poverty: global evidence. *Environmental Science and Pollution Research*, *28*, 35188-35225.
- Nguyen, T. L. H., & Nagase, K. (2019). The influence of total quality management on customer satisfaction. *International journal of healthcare management*, *12*(4), 277-285.
- Nguyen, T., Novak, R., Xiao, L., & Lee, J. (2021). Dataset distillation with infinitely wide convolutional networks. *Advances in Neural Information Processing Systems*, *34*, 5186-5198.
- Ozili, P. K., Ademiju, A., & Rachid, S. (2022). Impact of financial inclusion on economic growth: review of existing literature and directions for future research. *International Journal of Social Economics*.

- Park, C. Y., & Mercado Jr, R. (2018). Financial inclusion, poverty, and income inequality. *The Singapore Economic Review*, *63*(01), 185-206.
- Park, C. Y., & Mercado, R. (2021). *Understanding financial inclusion: What matters and how it matters* (No. 1287). ADBI Working Paper.
- Polat, E., Tesmer, H., Reese, R., Nickel, M., Wang, D., Schumacher, P., & Maune, H. (2020). Reconfigurable millimeter-wave components based on liquid crystal technology for smart applications. *Crystals*, *10*(5), 346.
- Qamruzzaman, M., & Jianguo, W. (2018). Nexus between financial innovation and economic growth in South Asia: evidence from ARDL and nonlinear ARDL approaches. *Financial innovation*, *4*(1), 20.
- Ramji, M. (2009). Financial inclusion in Gulbarga: Finding usage in access. *Center for micro finance working paper*, *26*.
- Santomauro, D. F., Herrera, A. M. M., Shadid, J., Zheng, P., Ashbaugh, C., Pigott, D. M., ... & Ferrari, A. J. (2021). Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the
- Sarma, M. (2008). *Index of financial inclusion* (No. 215). Working paper.
- Shittu, A. I. (2012). Financial intermediation and economic growth in Nigeria. *British Journal of Arts and Social Sciences*, *4*(2), 164-179.
- Wen, J., Mughal, N., Zhao, J., Shabbir, M. S., Niedbała, G., Jain, V., & Anwar, A. (2021). Does globalization matter for environmental degradation? Nexus among energy consumption, economic growth, and carbon dioxide emission. *Energy policy*, *153*, 112230.
- Zhang, F., Mei, Y., Nguyen, S., Zhang, M., & Tan, K. C. (2021). Surrogate-assisted evolutionary multitask genetic programming for dynamic flexible job shop scheduling. *IEEE Transactions on Evolutionary Computation*, *25*(4), 651-665.
- Zhang, X., Ang, E. C. X., Yang, Z., Kee, C. W., & Tan, C. H. (2022). Synthesis of chiral sulfinate esters by asymmetric condensation. *Nature*, *604*(7905), 298-303.