Unveiling the Defects Associated with the Public Residential Buildings in Nigeria

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Abstract
Lack of attention given to government residential buildings in Nigeria has resulted in the poor and deplorable states of such buildings. This can be attested to by a casual walk along the public residential estates in the state's capital in the study area as high rate of deterioration which increasingly shows on the colour, texture and conditions of the finishes is observed. This study sought to identify and examine the defects associated with the government residential estates in Lagos, Ibadan, Abuja and Ilorin which fall across various climatic zones in Nigeria. Survey research which involved the use of fieldwork and observations were adopted. The total population of 3784 was studied and a sample size of 421 buildings was used. The data was collected through questionnaires which were structured in the identification of the defects, and the on-site building inspection assisted in examining the key defects identified. Inferential statistics were used to analyse the data and findings from the study revealed that peeling/blistering, cracks, dampness and algae growth were among the key defects associated with the buildings while on-site inspection carried out confirmed the severity of the defects, and buttressed that the buildings were in a deplorable state. The study explored some common defects affecting the buildings and provides the platform for the intervention of the various state governments in the deteriorating states of government residential buildings in the country.

Keywords: Defects, external finish, Nigeria, paint, public residential buildings.

1.0. Introduction

The incidence of anomalies on the external envelope of buildings appears to have great importance. According to Watt (1999), Trotman (1994) and Database analysis (1997), about 50% of anomalies recorded negatively affect the external building envelope. The decay noticed in buildings is a natural process and unavoidably takes place in time, not being necessarily the result of design error or construction deficiency.

The mechanisms of deterioration are the consequence of the interaction of two independent variables: the building, as a physical object and the environment, as a source of agents(Harris, 2001). External buildings finishes have always been subject to attack by the temperature, rainfall, humidity, sunshine and solar radiation (Smith, et al., 2011). These attacks which have led to the degradation of the external surfaces have not only been limited to the facades of residential but also public buildings all over the world. According to Nwanko (2017), architectural products in different parts of the world such as York Minster and Westminster Abbey have been severely affected in recent years. The Taj Mahal in India, the Colosseum in Rome and monuments in Krakow, Poland are continuing to deteriorate.

It is a similar case with the government residential estates in the selected cities of Lagos, Ibadan, Abuja and Ilorin where thepaint used as an external finish in the buildings have continued to deteriorate immediately after two or three rainy seasons of application. The rate of deterioration in this tropical climate is so frightening that it has continued to generate public discussion among the users and all other stakeholders in the building industry.

This is dictated by the persistently high cost of external building maintenance by the building owners. The maintenance of the external finish of the building is seen as an essential component of sustainable building arrangement because of its aesthetic purpose thereby epitomizing the image of the building and providing protective functions to the underlying layers of the building (Boussabaine and Kirkham,2004).

Most of the finishes could no longer serve the purpose for which they were specified.Aluko and Ogunsote (2013) opine that with time, external finishes are prone to degradation and loseboth their defensive and decorative and functions. External building finishes play a vital role by increasing the durability of external structure, protecting against climatic hazards and providing aesthetic expression (Folorunso, 2012).

A casual work along the urban centres in the study area reveals a high rate of deterioration which increasingly show on the colour, texture and conditions of these buildings.

Unfortunately, there has been little documentation on the level of degradation caused by the time induced defects exhibited by these public residential buildings. It is against this backdrop that this study investigates and documents the nature and extent of deterioration caused by the symptoms of paint defects in public residential buildings in different cities of Nigeria.

2.0 An Overview of Occurrence and propagation of defects on Paint

Paint is used extensively as an external finish on cement plastered facades and concrete surfaces. De Silva and Ranasinghe (2010) opine that it ranked as the third most critical defects that require maintenance in residential buildings. This, however, emphasises the need for proper attention to the choice and use of paint in building projects. The major and noticeable defects that are associated with paints are:

a. Stain/Uneven discolouration

Staining and colour change mostly affects the visual quality of a façade and generally appears in the very early years of the service life of paint coatings. After the paint is applied, it may fade or get discoloured, this is caused by particles in the wall reacting with the paint when it is drying. Discolouration could also be caused by water seepage, or by contaminants in metal or wood. Poor and porous substrates according to Gonglaves, Pel and Rodrigues (2009); Radfar, Jassbi, Ghoreishi, Khanmohammadi and lborzzi (2010), increase the sucking of moisture from paint thereby causing discolouration.

Dull and sober colour tones obtained from inorganic pigments are more resistant to sunlight and have lower fading rates than brighter and more exotic colour tones obtained from organic pigments(Teo, Chew and Harikrishna, 2005).Shirakawa, Loh, John, Silva and Geylarde (2011)opine that discolouration occurs faster in the coastal environment than the hinterland

b. Peeling

This is a gradual loss of adhesion of the paint film ultimately leading to its peeling from the substrate and majority of peeling problems occur on surfaces exposed to the rain, sun, and the variation degree of temperature(Nepal and Rai, 2010; Contant Junior, Machado and Lona, 2010). Hua-Tzu and Hong-Hsiang (2010) attribute the larger percentage of peeling of paint to the environmental condition of the coastal environment than the hinterland.

Peeling paint is always the result of poor surface preparation.Peeling usually occurs on building facades, mainly on plastered walls, columns and other areas which are exposed to

excessive rain and great dampness. Some buildings that are located near the sea may face a much higher risk once the signs of peeling become visible on the exterior walls (Md. Kasim, 2009).

c. **Crackliness**

The age of a building exerts a positive effect due to the gradual deterioration in the condition of the underlying layers, which translates into the appearance of cracks on the external finish. According to Teo, Chew and Harikrishna (2005),cracks may also arise due to differential movements of other parts of the building and emerge on the finish layer; these cracks may also become prominent with age. Proximity to vegetation leads to fluctuations in moisture levels and condensation, thereby causing possible water impregnation and damage in the form of crack patterns.

d. **Dampness**

The dampness of substrate is a risk factor of failure in the painted wall (Corvo, Reyes, Valdes, Villasenor, Cuesta, Aguilarand Quintana, 2010). Brito, Goncalves and Faria (2011)

e. Algae growth

Algae and fungus can grow when the surface is continually damp and dirty and the gradual deterioration of the condition of the substrate and other underlying layers over the years provides possible gateways for moisture movement through the layers to the finish layer, and hence, creates favourable conditions for algae growth. Moisture and dampness are the primary causes of fungal growth on painted walls in buildings (Hoang, Kinney, Corsi and Szaniszib, 2010; Olaf, 2011). High humidity also favours its growth at the surface of external walls.

f. **Chalking**

Chalking is caused by the deterioration of the surface layer of the film, caused by exposure to ultra-violet radiation(Teo, Chew and Harikrishna, 2005).The protective properties of the paint film generally reduce with time, thereby leading to the occurrence of chalking.Radfar, Jassbi, Ghoreishi, Khanmohammadi and lborzzi, (2010) observe that the rate of chalking increases with the age of the paint. This suggests why chalking usually occurs after some time of application and become defaced after 2years of repainting.

Highly porous substrates that are not properly primed also increase the sucking of moisture from dry paint and cause chalking Also, the rate of chalking increases with the age of paint (Gonglaves, Pel and Rodrigues, 2009; Radfar, Jassbi, Ghoreishi, Khanmohammadi and

lborzzi, 2010).This suggests why chalking usually occurs after some time of application, and become defaced after less than 2years.

2.2 Causes of Defects of Paint

Evelyn, Chew and Harikrishna (2005) argue that paint finish may not perform in the manner intended, and fail to provide the desired functionality for the intended time period possibly due to i) exposure to adverse environmental conditions; ii) poor workmanship during application and iii) inadequate quality of the finish material/substrate and identified weather, material composition of paint used, degree of workmanship and building characteristics/attributes as influencing the occurrence and propagation of defects on the external paint finish.

Paint defects ranked as the third most critical defects that require maintenance in residential buildings in a study carried out in Sri Lanka by de Silva and Ranasinghe (2010). The common causes of the defects according to Hinks and Cook (2003), which also agree with Radfar, Jassbi; Ghoreishi; Khanmohammadi and lborzzi (2010) are loss of adhesion, poor paint quality, uneven application, damp background, high porous background, dirty background, chemically unstable background, incompatibility between substrate and paint, and permeability of coatings.Abubakar.

Wan Ibrahim & Megat Johari (2011)submit that the condition of the substrate over which the paintwork is applied can be responsible for the occurrence of defects on the paint finish.Common symptoms are peeling (differential movement; blistering (mixing/application fault or moisture/resin entrapment; chalking (eroding of surface); wrinkling (uneven paint application); Continuous dampness; efflorescent growth; colour variability/discolouration

3.0 Research Methodology

The methodology of this study was premised on the determination of the deterioration pattern of paint used as an external finish in Lagos, Ibadan, Abuja and Ilorin. A survey method was used through the development of structured questionnaires for the household heads as respondents.

The research population was 3784 buildings out of which 421 was selected as sample size. An explicit quantitative relationship between a variable quantifying the extent of deterioration of paint manifested in the form of defects and a set of variables identified as

influencing the onset and propagation of the defects was determined. Joint consideration of the extent of deterioration was thus determined.

The dependent variables are the 'defect index' values which measure the extent or percentage of the facade area affected by the defect. A four-point scale was used for measurement with 1 denoting as no occurrence of the defects on the facade, 2 indicating that few signs of defects on the façade, 3 indicating general defects and 4 as severe defects on the façade. The independent variables are stains, chalking, peeling/blistering, cracks, dampness and algae growth. The Inferential statistics were employed to analyse the data through SPSS (Statistical Package for Social Science, version 16) which was used to test the hypothesis of the research. The hypothesis of the research is stated thus:

$H_0$1: There is no significant relationship between the time induced defects and the rate of degradation of the external paint finish.

H_A1: There is a significant relationship between the time induced defects and the rate of degradation of the external paint finish.

4.0 Findings and Discussions

The questionnaires administered consist of five variables. For this study, the respondents were asked to indicate in years on a Likert Scale of 1-7 on the questions which stated thus: V34- How often did you carry out the repainting of the wall, V35-How soon after painting did you experience stains/ change in brightness and colour, V36-When did you notice formation of white powder (chalking) on the wall,V37-How often did you experience loss of adherence of paint to the wall (peeling and blistering),V38-How often did you notice appearance of cracks on the paint,V39-How soon after painting did you experience condition of the painted surface being slightly wet (dampness), V40-How soon after painting did you experience the growth of algae on the paint.

These variables according to Roy et al (1996); Morcillo (1999); Malshe and Waghoo (2004; Gonclaves et al (2009); Komshin (2010); Anderson et al (2011) are the major symptoms of defects on painted wall. V34 as the dependent variable was measured through V35, V36, V37, V38, V39, and V40 as independent variables.

The frequency of repainting ('How often do you carry out the repainting of the exterior wall?') as shown in table I also indicates that 29 (7.14%) of the 409 buildings were repainted

a year after painting. 86 (21.18%) undertook repainting after 2 years, 98 (24.18%) after 3 years, 41(10.10%) of the buildings went through another repainting after 4 years. 90 (23.64%) of the buildings were repainted between 5 and 6 years while 56 (13.79%) underwent repainting above 7 years. This means that 184 (45.32%) of the buildings out of the 409 in all the four climatic zones required repainting within 2 - 3 years of paint application.

The appearance of changein the colour of paint (’How soon after painting do you experience discolouration?’) in Table 1 began to show in 44.49% of the buildings after 2 years of repainting. This same defect was delayed until between 3 and 6 years in 44.49% of the buildings across the zones, while 11.74% of the buildings reveal a change in colour and brightness above 7 years. The variation in the number of years required for repainting suggests discolouration occur in all the zones. Poor and porous substrates, according toto Gonglaves, Pel and Rodrigues (2009); Radfar, Jassbi, Ghoreishi, Khanmohammadi and lborzzi (2010), increase the sucking of moisture from paint, thereby causing discolouration.

The formation of white powder on the surface of painted exterior wall (‘When did you notice formation of white powder on the wall otherwise known as chalking?’) as shown in the table occurred in 106 (26.17%) out of the 405 buildings sampled and this happened in 3years after repainting had been done.

This is followed by 98 (24.2%) out of 405 buildings across all the climatic zones, that exhibited white powder on the external surface after 2 years of repainting. The result further shows that 29.62% of the buildings revealed the manifestation of white powder between 4 and 6 years, while 11.62% displayed chalking above 7 years. The implication of the result is that discolouration appeared in all the buildings across the zones even though the rate of appearance differs. The rate of chalking increases with the age of paint as observed by Radfar, Jassbi, Ghoreishi, Khanmohammadi and lborzzi (2010), this suggests why chalking occurs after some time of application and become defaced after 2years of repainting.

Peeling of paint (‘How often did you experience loss of adherence of paint to the wall?’**)** began to occur in 111 (27.14%) out of the 409 buildings in all the four selected zones in 2 years after repainting. 88 (21.52%) of the buildings show signs of peeling and blistering after 3 years while the defect manifested in 124 (30.32%) out of 409 buildings between 3 and 6 years after repainting as shown in Table 48.

However, the result reveals that 14.18% of the buildings showed signs of peeling and blistering above 7 years. The result indicates the occurrence of peeling in 2 years compared to

3years and above 7 years in some zones. This is supported by the findings of Nepal and Rai (2010); Contant, Junior, Machado and Lona (2010), and Hua-Tzu and Hong-Hsiang (2010), who attributed the larger percentage of peeling of paint to the environmental condition of the coastal environment than the hinterland.

The appearance of cracks in the paint (‘How often did you notice the appearance of cracks on the paint?'): The frequency result reveals that 109 (26.91%) of the buildings out of 405 sampled noticed the appearance of cracks in 2 years, 63 (15.56%) of the buildings in all the zones shows cracks on the paint in 3 years, 60 (14.81%) of the buildings in 4 years, while 82 (20.25%) of the buildings manifest cracks between 5 and 6 years. However, 57 (14.07%) showed cracks above 7 years.

The wetness of the painted surface (‘How soon after painting did you experience the condition of the painted surface being wet, otherwise known as relative humidity?') as shown in the table occurred in 103 (25.31%) out of the 407 buildings sampled, and this happened in 2 years. This is followed by 70 (17.20%) out of 407 buildings across all the climatic zones that exhibited wetness on the surface of the paint after 3 years. The result further shows that 133 (32.67%) of the buildings revealed the manifestation of wetness between 4 and 6 years while 57 (11.62%) displayed buildings with conditions being wet above 7 years.

The growth of algae (‘How soon after painting did you experience the growth of algae on the paint?’) in all the four zones reveals 97 (23.77%) of the buildings exhibited the growth of algae 2 years after repainting, followed by 73 (17.89%), which occurs 3 years the buildings had been repainted. 66 (16.18%) of buildings fell within 4 years, 60 (14.71%) occurred in 5 years while 30 (7.35%) buildings show the growth of algae 6 years after repainting.

The result reveals that 60 (14.75%) of the buildings did not manifest the growth of algae until after 7 years. This suggests that a wide range of differences exist between the occurrence of algae growth in all the locations. While some showed the signs of the manifestation of algae growth within a period of 2 years, others showed it in close to 4 years, while it did not manifest until 6 years in some areas. Moisture and dampness are the primary causes of fungal growth on painted walls in buildings (Hoang, Kinney, Corsiand and Szaniszib, 2010; Olaf, 2011). High humidity also favours its growth at the surface of external walls.

Table 1: Frequency Distribution for the Time Induced Defects of External Paint Finish

	Variables	Once a year Frequency (%)	Two years Frequency (%)	Three years Frequency (%)	Four years Frequency (%)	Five years Frequency (%)	Six years Frequency (%)	Above seven years Frequency (%)
V34	Repainting	29 (7.14)	86 (21.18)	98 (24.14)	41 (10.10)	54 (13.30)	40 (9.85)	56 (13.79)
V35	Stains/change in brightness and colour	42 (10.27)	132 (32.27)	94 (22.98)	27 (6.60)	36 (8.80)	25 (6.11)	48 (11.74)
V46	Formation of white powder (Chalking)	25 (6.17)	98 (24.20)	106 (26.17)	47 (11.60)	41 (10.12)	32 (7.90)	47 (11.60)
V37	Loss of adherence of paint to the wall (Peeling & Blistering	18 (4.40)	111 (27.14)	88 (21.52)	55 (13.45)	50 (12.22)	19 (4.65)	58 (14.18)
V38	The appearance of cracks on the paint	23 (5.68)	109 (26.91)	63 (15.56)	60 (14.81)	56 (6.42)	26 (6.42)	57 (14.07)
V39	Condition of the painted surface being wet:	38 (9.34)	103 (25.31)	70 (17.20)	53 (13.02)	57 (14.00)	23 (5.65)	57 (14.00)
V40	Growth of algae on the paint	17 (4.17)	97 (23.77)	73 (17.89)	66 (16.18)	60 (14.71)	30 (7.35)	60 14.71)

Table 2 showed the correlation matrix between external paint degradation and the defect factors. The table revealed that there is a positive relationship between external paint degradation and stains {r (408) = 26; p< .01}, chalking {r (408) = .50; p< .01}, peeling/blistering {r (408) =. -62; p< .01}, cracks {r (408) =.-.43; p< .01}, dampness {r (408) = .28; p< .01}, and algae {r (408) = .17; p< .01}, across various climatic zones.

The findings imply that the higher the perceived external paint degradation, the higher the defect factors of stains, chalking, peeling/blistering, cracks, dampness, and algae. It also implies that the lower the perceived external paint degradation, the higher the defect factors of stains, chalking, peeling/blistering, cracks, dampness, and algae.

Table 2: Correlation Matrix Showing Relationship between External Paint Degradation and the Defect Factors

	Variables	Mean	SD	1	2	3	4	5	6	7
1.	**Stains**	2.90	1.90	-						
2.	**Chalking**	3.80	1.91	.21**	-					
3.	**Peeling/blistering**	3.85	1.91	.33**	.43**	-				
4.	**Cracks**	3.92	1.95	.35**	.36**	.87**	-			
5.	**Dampness**	3.61	1.93	.27**	.27**	.72**	.76**	-		
6.	**Algae**	3.88	1.90	.17**	.34**	.51**	.53**	.69**	-	
7.	**ExPaintDe**	2.38	.84	-.26**	.50**	.62**	-.43**	.28**	.17**	-

Significant at .05; **significant at .01 level; ExPaintDe –External paint degradation

Testing of Hypothesis

H_o1: There is no significant relationship between the time induced defects and the rate of degradation of the external paint finish.

H_A1: There is a significant relationship between the time induced defects and the rate of degradation of the external paint finish.

Having established the relationship among the variables, it is expedient to ascertain the predicting values of the independent variables (Stains, chalking, peeling/blistering,

cracks, dampness, and algae) on the dependent variable (external paint degradation) across all the four locations.

Table 3 showed that the identified defect factors viz: stains (β =-.351, t = -8.655; p < .05), chalking (β =.634, t = 14.698; p < .05), peeling/blistering (β =-.224, t = -2.771; p < .05), cracks (β =.559, t = 6.866; p < .05), dampness (β = .236, t = 2.227; p < .05), and algae (β =-.108, t = -1.898; p > .05) significantly independently predict external paint degradation.

The table also revealed that all the selected defect factors of, stains, chalking, peeling/ blistering, cracks, dampness, and algae significantly and jointly predicted external paint degradation in the selected locations [F (6, 409) = 87.981; p < .05], R^2 = .628. The results showed that 62.8% of the variance accounted for in external paint degradation are caused by the selected independent variables of stains, chalking, peeling/blistering, cracks, dampness, and algae as used in this study.

Table 3: Summary of multiple regression analysis showing the effects of time induced defects on external paint degradation

Variables	**B**	**T**	**P**	**R^2**	**Adjusted R^2**	**F**	**P**
Stains	-.351	-8.655	< .05				
Chalking	.634	14.698	< .05	.667	.628	87.98	< .05
Peeling/blistering	-.224	-2.771	< .05				
Cracks	.559	6.866	< .05				
Dampness	.236	2.227	< .05				
Algae	-.108	-1.898	< .05				

It is also important for the study to examine how defect factors will predict the external paint degradation in each of the estates across the various selected climatic zones. Thus, regression analysis was used to identify independent and joint contributions of the independent variables on the external paint degradation.

However, the Lagos climatic zone gave us an insight to the lead hypothesis. It was found out from Table 4 that all the identified independent variables of stains (β =--.231, t = -

3.490; p < .05), chalking (β =.578, t = 7.139; p < .05), peeling/blistering (β =--.254, t = --4.299; p < .05), cracks (β =-.180, t = -2.053; p < .05), dampness (β = .235, t = 3.687; p < .05), and algae (β =-.191, t = -2.126; p > .05) significantly independently predict external paint degradation. It was also discovered that all the identified independent variables had significant joint prediction on external paint degradation.

In Ibadan, it was found out that stain stains (β =-.612, t = -6.923; p < .05) and chalking (β =.223, t = 3.629; p < .05) had independent significant predictions on external paint degradation. However, peeling/blistering (β =-. -051, t = --.367; p < .05), cracks (β =-.102, t = -.748; p < .05), dampness (β =-.177, t = -1.486; p < .05), algae (β =.178, t = 1.875; p < .05) did not have independent significant predictions on external paint degradation. It was also discovered that all the identified independent variables had significant joint prediction on external paint degradation.

Table 4 revealed that in Abuja, stains (β =-.247, t = -3.041; p < .05), chalking (β =.657, t = 8.183; p < .05), peeling/blistering (β =-.342, t = -3.517; p < .05), cracks (β =.370, t = 3.468; p < .05) were significantly and independently predict external paint degradation. However, dampness (β =-.002, t = -.015; p > .05) and algae (β =-.137, t = -1.223; p > .05) did not significantly and independently predict external paint degradation. It was also discovered that all the identified independent variables had significant joint prediction on external paint degradation.

Also, Table 4 revealed that in Ilorin climatic zone, stains (β =--.212, t = -2.032; p < .05), chalking (β =.446, t = 4.322; p < .05), and cracks (β =.892, t = 2.093; p < .05). However, peeling/blistering (β =-.533, t = -1.143; p > .05), dampness (β = -.074, t = -.145; p > .05), and algae (β =-.333, t = -.886; p > .05) did not have independent significant predictions on external paint degradation. It was also discovered that all the identified independent variables had significant joint prediction on external paint degradation.

Thus, hypothesis three which state that there is no significant relationship between the defect factors and external paint degradation was rejected. This implies that there is a significant relationship between the defect factors and external paint degradation in all the selected climatic zones.

Table 4: Summary of Ordinal Regression Analysis Showing the effects of time induced Defects on Rate of External Paint Degradation Across the Selected Locations.

Location	Variables	Coef	Z	P	Pseudo R^2	P
LAGOS	Stains	**-.1.180**	**4.30**	**0.000**		
	Chalking	.254	0.74	0.459	0.6349	0.000
	Peeling/blistering	**-.849**	**-2.16**	**0.031**		
	Cracks	-.276	-0.83	0.406		
	Dampness	**.112**	**-216**	**0.003**		
	Algae	**.094**	**0.33**	**0.001**		
IBADAN	Stains	.259	1.12	0.262		
	Chalking	.321	1.32	0.185	0.0794	0.000
	Peeling/blistering	**-.300**	**-1.18**	**0.038**		
	Cracks	**-.328**	**-1.45**	**0.046**		
	Dampness	.211	0.98	0.329		
	Algae	.224	1.33	0.182		
ABUJA	Stains	**.449**	**1.03**	**0.050**		
	Chalking	**2.202**	**3.25**	**0.001**	0.5360	0.0379
	Peeling/blistering	-.594	-0.95	0.344		
	Cracks	-1.130	-1.53	0.127		
	Dampness	1.198	1.32	0.185		
	Algae	-.793	-1.06	0.289		
ILORIN	Stains	**-1.233**	**-1.88**	**0.050**		
	Chalking	**2.202**	**3.25**	**0.001**	.2693	0.0729
	Peeling/blistering	-.593	-0.95	0.344		
	Cracks	-1.130	-1.53	0.127		
	Dampness	1.197	1.32	0.185		
	Algae	-.792	-1.06	0.289		

5.0 Conclusion

The evaluation of degradation caused by defects on external paint finish in public residential buildings in different climatic zones of Nigeria presented in this study is based on the field appraisal of the anomalies, quantification and transportation of the results into a statistical model. In Lagos, the identified independent variables of stains, chalking

peeling/blistering, dampness and algae growth have a significant and independent prediction on external paint degradation while cracks had no significant and independent prediction on external paint degradation.

In Ibadan, stains and chalking have significant and independent predictions on external paint degradation. However, peeling/blistering, cracks and dampness and algae growth do not have significant and independent predictions on external paint degradation.

The result reveals that in Abuja, stains, chalking, peeling/blistering, crackshave significant and independent predictions on external paint degradation. However, dampness and algae growth did not significantly and independently predict external paint degradation. It was also discovered that all the identified variables of stains, chalking, peeling/blistering, cracks, dampness and algae growth had a joint prediction on external paint degradation.

The result in Ilorin shows that stains, chalking and cracks independently and significantly predict external paint degradation, while peeling/blistering, dampness and algae growth, do not have independent and significant predictions on external paint degradation. However, it was also discovered that all the identified variables of stains, chalking, peeling/blistering, cracks, dampness and algae growth had a joint prediction on external paint degradation across all the selected residential estates.

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